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NUCLEAR REGULATORY COMMISSION

Title: Strata Energy, Inc.
Ross In Situ Recovery Uranium Project

Docket Number: 40-9091-MLA

ASLB Number: 12-915-01-MLA-BD01

Location: Gillette, Wyoming

Date: Tuesday, September 30, 2014

Work Order No.: NRC-1100 Pages 260-476

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ATOMIC SAFETY AND LICENSING BOARD PANEL

HEARING

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In the Matter of: : Docket No. 40-9091-MLA

STRATA ENERGY, INC. :

: ASLBP No.

(Ross In Situ Recovery : 12-915-01-MLA-BD01

Uranium Project) :

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Tuesday, September 30, 2014

Wyoming Meeting Room

Energy Hall

CAMP-PLEX Multi-Event

Facilities

1635 Reata Drive

Gillette, Wyoming

BEFORE:

G. PAUL BOLLWERK, III, Chairman

DR. RICHARD F. COLE, Administrative Judge*

DR. CRAIG M. WHITE, Administrative Judge

*present via teleconference

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P-R-O-C-E-E-D-I-N-G-S

9:31 A.M.

CHAIRMAN BOLLWERK: Good morning. Let me begin by introducing ourselves this morning. To my right is Dr. Craig White. Judge White is a geologist and a part-time member of the Atomic Safety and Licensing Board Panel. My name is Paul Bollwerk. I'm an attorney, a full-time panel member, and the chair of this Atomic Safety and Licensing Board.

A second technical member of this Board is Judge Richard Cole. Judge Cole is an environmental engineer and a full-time member of the Atomic Safety and Licensing Board Panel. Although recent health problems have precluded Judge Cole from traveling to Wyoming for this week's session, he will be participating via video and teleconference in this evidentiary hearing.

At this point, Judge Cole, if you could say hello, I hope we can see your picture here in the hearing room.

JUDGE COLE: Hello, everybody. I hope your weather out there is pleasant. I understand you had a little rain yesterday. I'm surprised it wasn't snow.

CHAIRMAN BOLLWERK: Actually, we had a

little more rain this morning. But it wasn't snow.

JUDGE COLE: That's good.

CHAIRMAN BOLLWERK: All right, thank you very much, Judge Cole.

Each of us is an independent Administrative Judge appointed by the five member Nuclear Regulatory Commission as members of the Atomic Safety and Licensing Board Panel. Members of the Panel are designated by the Agency's Chief Administrative Judge acting at the behest of the Commission to serve on three Judge Licensing Boards such as this one that preside over hearings in which the Atomic Energy Act permits a hearing to be held relative to the construction or operation of nuclear power plants, use of nuclear materials, or the storage of nuclear waste.

The Panel's Administrative Judges do not work for or with the NRC staff relative to the staff's own review of licensing and enforcement matters. Rather, we are charged with deciding the first instance what issues will be litigated in the hearing and to those issues we find litigable, making a determination regarding their substantive validity in terms of granting, conditioning, or denying the requested license or sustaining or modifying the

proposed enforcement action.

Our decisions on hearing matters generally are subject to review first by the Commission, as the Agency's Supreme Court, and then by the Federal Courts including in appropriate instances, the United States Supreme Court.

This Licensing Board is here today to conduct an evidentiary hearing regarding the application submitted by Strata Energy, Inc., or SEI, in January 2011, requesting issuance of a combined Atomic Energy Act or AEA Section 11(z) source and Section 11(3)(2) byproduct materials license that would authorize the construction and operation of the Ross in situ recovery or ISR Uranium Project in Crook County, Wyoming.

In July 2011, the Commission issued a notice in Volume 76 of the Federal Register at page 41,308, outlining the process for becoming a party in a hearing contesting the SEI application. And two public interest groups, the Natural Resources Defense Council and the Powder River Basin Resource Council, filed a joint intervention petition challenging various aspects of the SEI application and the accompanying environmental report, or ER.

In a February 2012 decision, LBP 12-3

reported in Volume 75 of the Nuclear Regulatory Commission Issuances at page 164, the Board found that joint intervenors had established their standing or legal interest in this proceeding and it proffered four admissible National Environmental Policy Act, or NEPA, related environmental contentions. A decision of the Commission subsequently affirmed in CLI 12-12, reported in Volume 75 of NRC Issuances at page 603.

Thereafter, with the March 2013 and February 2014 issuance of the NRC staff's draft and final supplements to the Agency's generic environmental impact statement on ISR mining facilities relative to the Ross ISR facility, the Board concluded that the focus of three of joint intervenors' four admitted environmental contentions that appropriately moved from the SEIER to the staff's environmental documents so that these previously admitted challenges to the SEIER became litigable challenges to the staff's final supplemental environmental impact statement, or SEIS. And thus are the subject of the evidentiary hearing sessions we will be conducting over the next several days.

To summarize, the issues under consideration will be whether the NRC staff's final SEIS fails to characterize adequately baseline or pre-

mining groundwater quality and fails to establish that groundwater samples were collected in a scientifically-defensible manner; (2) failed to analyze the environmental impacts if the applicant is unable to restore groundwater or applicable groundwater quality standards; and (3) inadequately assesses the likelihood of impacts of fluid migration to adjacent groundwater because of unplugged exploratory bore holes and insufficient information provided by SEI 6 monitor well clusters and 24-hour pump tests at 4 of these clusters.

With us today as the parties to the hearing are SEI, the NRC staff, and the joint intervenors. Let's have the parties identify themselves for the record, starting with SEI, then moving to the staff, and finally to joint intervenors

MR. PUGSLEY: Your Honor, Christopher Pugsley, counsel for SEI. I'm accompanied at counsel's table by Anthony J. Thompson, counsel for SEI; and Jack Fritz, WWC Engineering.

CHAIRMAN BOLLWERK: Thank you. Next, sir. The NRC staff.

MR. HARPER: Your Honor, I am Richard Harper, counsel for the NRC staff. With me here to my left is Emily Monteith, counsel for the NRC staff; and

to my right, Sabrina Allen, NRC staff paralegal.

CHAIRMAN BOLLWERK: All right, thank you. And joint intervenors.

MR. FETTUS: Good morning, Your Honor. My name is Geoffrey Fettus. I am a senior attorney for the Natural Resources Defense Council and I'm joined here at counsel table to my left is Shannon Anderson of the Powder River Basin Resources Council. And to my right joining me is Howard Crystal of the law firm of Meyer Glitzenstein & Crystal.

CHAIRMAN BOLLWERK: Thank you. Also in terms of an individual who might have been involved in this proceeding, I would like to make a mention of Dr. Kenneth Mossman. Dr. Mossman originally was one of the Board members for this Licensing Board. He was involved in the initial ruling on contention, admissibility, and standing and Judge Mossman served with the Board until about this time last year, actually. He was appointed in the summer, the late summer of 2013 by President Obama to the Defense Nuclear Facilities Safety Board, part of DOE, that oversees defense nuclear facilities and had actually stepped aside and Judge White had taken his place on the Board. About a month he actually was a professor at Arizona State and about two months after he moved

to Washington to become a Defense Nuclear Facilities Safety Board member, he had a massive heart attack in the Washington Metro and could not be revived. Judge Mossman made great service to the Board and we do miss him. I wanted to recognize Kenneth Mossman who was a fine Licensing Board Panel member.

With regard to the three contentions being litigated, as was outlined in the Board's July 25th issuance regarding the administration of this evidentiary hearing, the three contentions were presented in the order that was outlined above, basically, one, two, and three as I read them previously.

Additionally, in our July 25th issuance, we indicated that while the admitted contentions all raise issues associated with the NRC staff's supplement to the Agency's generic environmental impact statement on ISR facilities, as the party with the ultimate burden of proof under 10 CFR Section 2.325 relative to the issuance of the requested license, SEI will present its witness and evidence for Board questioning first, followed by the NRC staff and then by joint intervenors.

Further, as we indicated in a September 25th issuance with respect to each contention, once we

have heard individually from each of the parties' witnesses regarding the contention, the Board may recall all three parties' witnesses for that contention for an additional round of Board questions during which the Board may afford an opportunity for each parties' witnesses to comment on the answers to Board questions provided by other parties' witnesses.

Also, while the Agency's 10 CFR Part 2, subpart L simplified hearing procedures governing this proceeding contemplate that all questions for the parties' witnesses will be posed by the Board. From time to time we will pause to allow the parties to propose and the Board to consider additional questions for the Board to put to the witnesses. And I should mention that since Judge Cole is coming in remotely, obviously, we'll have to take a brief recess while we talk with him about the questions that you propose. So it may take a little more time than usual, but hopefully we can be efficient at it, particularly after once we get into the swing of things.

Finally, as part of our July 25th guidance on the conduct of this evidentiary hearing, we indicated we would afford counsel an opportunity to make 15 minute opening statements. In that regard, in a moment we'll turn first to counsel for SEI for its

opening statement, followed by opening statements of staff counsel and joint intervenors' counsel.

Before we do so, however, I want to make mention of an aspect of this proceeding. As the Board has noted in various issuances, including its December 8, 2011 initial pre-hearing conference scheduling order and a July 25, 2014 notice regarding this evidentiary hearing session which is published in the Federal Register, Volume 79 at page 44,471, under Section 2.315(a) of Title 10 of the Code of Federal Regulations, presiding officers are authorized to entertain limited appearance statements from members of the public who are not otherwise parties to a proceeding. These statements which are placed in the official Agency docket of the proceeding are intended as an opportunity for members of the public to express their views about and may help the Board and/or the parties in their consideration of the issues in the proceeding.

As this juncture, the Board has received several written limited appearance statements and conducted a transcribed session in Sundance, Wyoming this past Sunday afternoon at which members of the public were afforded the opportunity to present their views and concerns to the Board orally. If, however,

there is anyone here who would like to provide the Board with a written limited appearance statement, there are forms available on the table just outside of this room that you can complete and return to the Board's law clerks, Kathleen Schroeder or Alana Wase or its administrative assistant, Karen Valloch, before this evidentiary proceeding adjourns. Or if you prefer, you can submit a statement by mail or email by following the instructions provided in the Federal Register notice published in Volume 79 of the Federal Register at page 44,472 and on the information flyer that's also available on the table just outside the hearing room.

In addition, I would observe that today we will be utilizing some technology that will aid the Board and the parties in conducting a more efficient proceeding. One of the things we'll be doing during this proceeding is marking the parties' exhibits electronically rather than using an ink stamp or labels as was customary in many judicial hearings. This may involve some interchange between the Board and our information technology technician, Joe Deucher, who is sitting over there to my left.

Also, we anticipate using display technology as part of the evidentiary presentations

which hopefully will make the information we'll be discussing with the parties' witnesses more accessible and understandable to those in the audience today. As I mentioned previously, Judge Cole will be participating from the Licensing Board Panel's offices in Maryland using videoconferencing and teleconferencing technology.

Finally as we begin today's evidentiary hearing, I would note that this is my cell phone, the one that won't call NRC headquarters right now, which I'm going to turn off and it's going to remain off for the balance of this session. You won't work anyway, I'll just turn you off. Okay.

I'd ask that all cell phones and similar electronic devices in the hearing room be turned off or placed on vibrate and that any cell phone conversations be conducted outside of this room. That will be the rule throughout this proceeding. Also, I would note that as is the case in our Rockville, Maryland hearing room, no food or beverages other than water are to be consumed in this hearing room and I very much appreciate folks following that guidance if you would, please. I recognize there are soda machines around the corner, but if you need to have a soda, please have it outside this room. And I would

very much appreciate that.

If none of the parties have anything for the Board at this juncture, let's turn to SEI counsel for their opening statement.

MR. FETTUS: Your Honor, this is Geoffrey Fettus of the Natural Resources Defense Council. We had one question that I'm sorry and I didn't get a chance to discuss it with my colleagues at SEI or NRC and this is not -- don't worry, this is no big surprise. I just wanted to ask if the Board would like and if it would make more sense to divide up the 15-minute introductions into 5 minutes before each contention, then we might be able to do 5 minutes now for the first contention which we're starting with, that SEI starts with. And then five minutes for the Contention 2 and then five minutes, so we don't get lost, so we have an introduction for each day. It was just a --

CHAIRMAN BOLLWERK: It's really up to counsel. The Board, we don't have a preference, I don't think.

MR. PUGSLEY: No objection from SEI.

MS. MONTEITH: No objection from the staff.

CHAIRMAN BOLLWERK: Okay, then we'll go

ahead and we'll do Contention 1 first and --

MR. HARPER: Thank you, Your Honor.

CHAIRMAN BOLLWERK: Given that, let me go ahead and read Contention 1 and that will sort of be an introduction of what we're going to do.

MR. HARPER: Your Honor, before we proceed, if I may bring up an issue?

CHAIRMAN BOLLWERK: Sure.

MR. HARPER: This is Richard Harper from the NRC staff. Staff counsel identified this morning an error with one of our exhibits.

CHAIRMAN BOLLWERK: Okay.

MR. HARPER: Specifically Exhibit NRC016. That exhibit and I'll read the title for you, the exhibit is entitled ND Resources (1977), Nubeth Joint Venture Environmental Report, Supportive Information to Application for Source Material License, Sundance Project.

In filing our exhibits, there were actually two separate types of this document in the Agency's ADAMS system and one was an excerpt of the full document and the other one was a full document. And the staff mistakenly filed the excerpt rather than the full document. We have discussed this with staff and our colleagues on SEI and the intervenors' counsel

and explained the situation to them. We have refiled that exhibit as NRC016R in its entirety. We've corrected the ML number and we have -- we are in the process of making paper copies to distribute for the convenience of the Board and the other parties.

CHAIRMAN BOLLWERK: Okay. So it's a staff exhibit it deals with -- given the number, I'm assuming it deals with Contention 1?

MR. HARPER: It does.

CHAIRMAN BOLLWERK: And you have already refiled it with the e-filing system?

MR. HARPER: We have.

CHAIRMAN BOLLWERK: Okay. So assuming you can give us the paper copies, I think everything should be good and we'll go ahead and maybe it's possible that one of the law clerks could check to see if it's come through the e-filing system at some point, if you can do that or not. I don't know if your computers allow that or not given the way we've got everything tied up. In any event, we'll try to check that. And if that's the case, then we can go ahead and just admit that revised -- you gave it an R number I take it?

MR. HARPER: We did.

CHAIRMAN BOLLWERK: Okay, then we'll just

admit the revised version when we get to that document.

MR. HARPER: Thank you.

CHAIRMAN BOLLWERK: Okay.

MR. PUGSLEY: Your Honor?

CHAIRMAN BOLLWERK: Yes.

MR. PUGSLEY: Chris Pugsley for SEI. We have conferred with all counsel about asking the Board what the procedure and timing will be of dealing with admission of the exhibits to the record. I know you had spoken about it in your opening remarks, but we were just wondering what your procedure would be and was wondering if we might offer a suggestion.

CHAIRMAN BOLLWERK: Okay, I'll tell you what my procedure will be and then you can offer your suggestion and then I'll tell you what my procedure will be.

MR. PUGSLEY: Yes, sir.

CHAIRMAN BOLLWERK: So you need to understand, I come from the background with the Appeal Panel, a number of years ago. I was an Appellate Judge for several years, the happiest two years of my life. And I became very attuned to the fact that if judicial records coming up from the Licensing Board are not done properly, it can be a big problem for the

appeal folks. So my intent here was to do contention by contention, basically party by party, take that party's exhibits and to identify them and admit the exhibits that relate to that contention.

Having said that, obviously, some of these contentions -- I'm sorry some of the exhibits relate to multiple contentions. That's fine. We'll admit the exhibit once. We're not going to go through several times. So in theory, the number of admissible contentions will get shorter as we get along. So that would be what I would intend to do. What would you prefer to do?

MR. PUGSLEY: I think that's just fine, Your Honor.

CHAIRMAN BOLLWERK: I'm not going to try to -- I don't want to make this, in fact -- in the past I've had counsel actually identify the documents as we go through each one. I'm going to do that very briefly. I don't want to put that burden on you because I know that's one of the things you don't like to do, but I think it's important to get at least an identification of each document as we put it into the record.

I know that probably the process now that many of the Judges are using is to admit things en

masse. I found that sometimes that works and sometimes it doesn't. And if we could just do each one, get it in, and then we don't have to worry about it any more. And hopefully we'll all walk away with a happy record and that's the bottom line. But if you have something else, I'd be glad to listen. But I think this will work.

MR. PUGSLEY: I completely understand. Thank you, sir.

CHAIRMAN BOLLWERK: And the first thing we'll do with each witness panel obviously is admit their testimony. That will be the first thing. And we're not using the former practice or the old practice of putting it into the transcript. We'll basically admit them as exhibits. But I may go ahead, after I swear in the witnesses, have them affirm their testimony like we used to do when we did -- when we put it in the transcript. It's always good to have them make sure that they tell us yes, indeed, they were the ones who wrote this or supervised the writing of it. Does that answer your question?

MR. PUGSLEY: Yes, sir. Thank you.

CHAIRMAN BOLLWERK: Anything else preliminary that we need to talk about? Okay, since we're going to do this contention by contention, this

is a good introduction. Let me just read the contention because it's always a good idea, we're supposed to be litigating.

So the first contention which is Environmental Contention 1, the title is the FSEIS fails to adequately characterize baseline (i.e., original or pre-mining) groundwater quality. And the contention states that the FSEIS fails to comply with 10 CFR Sections 51.90 to 94; 10 CFR Part 40, Appendix A; and NEPA, because it lacks adequate description of the present baseline, i.e., the original or pre-mining groundwater quality and fails to demonstrate that groundwater samples were collected in a scientifically-defensible manner using proper sampling methodologies. The FSEIS's departure from NRC guidance serves as additional evidence of these regulatory violations, NRC NUREG 1569 Standard Review Plan for in situ uranium extraction license applications Section 2.7.1, 2.7.3, 2.7.4, 2003. And that last thing I read is a citation to NUREG 1569 and specific sections to it that support the contention.

All right, and so if SEI would like to start and I guess we're going to do five minutes each on introduction to Contention 1.

MR. PUGSLEY: Good morning, Your Honor,

members of the Board, may it please the Court. My name is Christopher Pugsley and along with my co-counsel, Anthony Thompson, we are here on behalf of Strata Energy, Incorporated, or SEI, in support of its Ross ISR project NRC license.

As a general matter, Strata respectfully submits to the Board that its license application including its technical report and environmental report, subsequent responses to requests for additional information, and NRC's Draft and Final SEIS Safety Evaluation Report and the remainder of the record of decision adequately satisfy NRC regulations for 10 CFR Part 51 NEPA reviews.

Each of the three admitted contentions in this proceeding, including Contention 1, is classified as an environmental contention and implicate these environmental reviews as noted previously by the staff, including the information supplied by Strata.

Since none of the admitted contentions has been admitted as a safety contention, the intervenors' allegations do not constitute challenges to the Safety Evaluation Report and any other safety findings regarding the adequate protection of public health and safety and the environment either in the SER or incorporated into and as applied in the FSEIS and the

remainder of the ROD.

Despite this, Strata asserts its license application ROD go above and beyond the acceptance criteria denoted in NUREG 1569 guidance for ISR applications.

While NUREG 1569 may be characterized by some as technical guidance, Strata has noted in its initial statement of position that Table 1 of this document, specifically identifies resource areas which are encompassed in the admitted contentions that relate directly to NRC staff's environmental review and that should be taken into account from this proceeding.

Strata has engaged in a policy of early and often interaction with NRC staff, including multiple pre-license application submission meetings, a pre-submission audit meeting with staff and members of the public present for review, all of which again were open to public participation.

Moving to Contention 1 specifically, Strata's approach site characterization of groundwater at the Ross ISR project is consistent with NRC regulations at 10 CFR Part 40 and Appendix A criteria as they implement the Atomic Energy Act of 1954 as amended by the Uranium Mill Tailings Radiation Control

Act of 1978 and NRC staff's guidance at NUREG 1569 which represents its expert interpretation of the Commission's regulations as delegated under 10 CFR Part 1.41(b)(18) and (19) and which is to be accorded special weight and deference under Commission precedent as stated in the Yankee Atomic case, CLI 05-15. License applicants follow this guidance as it defines what is expected of a license applicant when applying for an ISR license.

The scope of NRC staff's need to review from a legal perspective is thoroughly discussed in Strata's initial statement of position and demonstrates that joint intervenors' consistent claims that more data is needed are refuted by Commission precedent, stating that agencies must be accorded the discretion to determine how much data is required for an initial licensing decision.

With respect to specific technical and environmental arguments, Strata submits that intervenors' claims are without merit and Strata will be relying on the expert testimony for Contention 1 of Mr. Ralph Knode, Mr. Hal Demuth, Mr. Errol Lawrence, and Mr. Ben Schiffer.

With respect to Contention 1, Strata's approved license application in the final record of

decision contained a required baseline groundwater quality data consistent with NRC regulations at 10 CFR Part 40 Appendix A Criterion 7 and guidance at NUREG 1569, Chapter 2 for site characterization. A fundamental legal question that sets the stage for Contention 1 is how the Commission's ISR regulatory program addresses two stages of groundwater quality characterization data and analyses, one from Appendix A Criterion 7 regarding "baseline" groundwater quality for an initial licensing decision and Criterion 5(b)(5) Commission-approved background for post-license issuance pre-operational water quality. This approach is consistent with the multi-faceted and on-going regulatory process that is sufficiently detailed and prescriptive assuming Strata compliance that the necessary "reasonable assurance" of protection of public health and safety is provided per Commission precedent in the Hydro Resources case at CLI-06-01.

Criterion 7 baseline groundwater quality as described in NUREG 1569, Chapter 2, is all that is required for an initial licensing decision from NRC, such as a grant of the Ross license. As discussed in Strata's initial position statement, NUREG 1569 states that review of the license application is "not based on comprehensive information." SEI 007 at 36.

For Criterion 5, Commission approved background, a license applicant submits procedures for how additional post-license issuance of groundwater quality data is gathered. With that said, Strata's license application in the final ROD provide enough data and analysis to satisfy the hard look requirement under NEPA. And as shown in Table 1 of NUREG 1569, as I said before, it applies. These resource areas are evaluated for an environmental review as well as a safety review.

As is standard in the licensing process, license conditions are imposed to require additional groundwater data to support Commission-approved background and these are in Strata's license, SEI 015, Conditions 10.13 and 11.3. And as stated above, this approach is specifically endorsed by Commission precedent in CLI-0601 which concurred the Licensing Board determination at post-license gathering of site-specific groundwater data to determine Commission-approved background is consistent with NRC regulations and performance-based licensing and sequential wellfield development of ISR projects.

As will be noted by our experts in their testimony, Strata not only complied with regulations, but went above and beyond those regulations in order

to demonstrate satisfaction of Criterion 7 baseline water quality data. Regarding potential impacts levied by the intervenors of impacts to the baseline water quality from well or bore hole drilling, Strata's expert, Mr. Knode's testimony shows that well drilling and development techniques used at the Ross site do not, in fact, result in the impacts alleged by the intervenors.

The intervenors also claim that past Nubeth operations have impacted current water quality. However, restoration was approved by both Wyoming Department of Environmental Quality and NRC for this project and the license was ultimately terminated by the NRC. Further, Strata's Exhibit SEI 019 also shows that Nubeth R&D site and current industrial wells in potentiometric surface demonstrates that groundwater is moving toward the historic Nubeth monitor wells and industrial wells.

With that said, and submitting to the Board our expert witness testimony for Panel 1, Strata respectfully requests that the Board find that Contention 1 does not merit a modification of NRC's record of decision including the final supplemental environmental impact statement. Thank you.

CHAIRMAN BOLLWERK: Thank you, sir. All

right, turn to the staff then.

MS. MONTEITH: Good morning, Your Honors. Emily Monteith for the NRC staff.

First, I'd like to say that the staff looks forward to answering the Board's questions during this oral portion of the evidentiary hearing. The staff is confident that it can provide the Board and also the public attending the hearing with information showing how carefully the staff considered the environmental issues raised by the admitted contentions.

As the staff explained in its testimony, and as it hopes to explain further over the course of the next few days, the staff thoroughly considered the baseline quality of groundwater at the Ross project area.

The staff's witnesses for Contention 1 are John Saxton, Johari Moore, and Kathryn Johnson. All of the staff's witnesses have extensive experience in their fields. Mr. Saxton is a hydrogeologist and a safety project manager for the Ross project license application. He has more than 28 years of experience in both the private and public sectors specializing in the field of hydrogeology and environmental investigations.

Ms. Moore is the environmental project manager for the Ross project license application. She has nine years of professional experience preparing environmental reviews related to the licensing of uranium recovery, fuel cycle, and irradiator facilities.

Finally, Dr. Johnson is a geochemist with over 30 years of experience in the geochemistry of uranium and associated metals. She served as a subject matter expert for the FSEIS on matters related to water quality and she was the principal editor of all sections related to geology, soils, and hydrogeology.

As the staff has explained in its written testimony, the staff's findings and conclusions in the FSEIS are drawn from the extensive information it considered during its review. This includes information submitted by Strata with its application and response to request for additional information.

In Contention 1, the joint intervenors argue that Strata must provide and the staff must analyze more information relating to the characterization of baseline groundwater for the Ross project. For this proposition, intervenors cite Criteria 7 and 5(b)(5) of 10 CFR Part 40, Appendix A.

As the staff explained in its written testimony, Strata did provide and the staff did analyze complete baseline groundwater quality information. Pursuant to Criterion 7 and more applicably, NUREG 1569, the Standard Review Plan for in situ leach uranium extraction license application.

The Standard Review Plan is the NRC's guidance for determining whether an applicant has provided the safety and environmental information necessary for the staff to determine whether to issue a license. The staff found that the baseline information provided by Strata met the acceptance criteria in the Standard Review Plan. This data formed the basis for the staff's discussion of baseline groundwater conditions at the Ross site in the FSEIS. The discussion of this information is found principally in Section 3.5.3.3 of the FSEIS such as Exhibit SEI009A.

Moreover, Strata will also be required as a condition of its license to establish the Commission -approved background concentrations in groundwater constituents prior to commencing operations at the Ross site. This requirement is included as Condition 11.3 of Strata's license and is described in the staff's SEIS. This approach is consistent with the

Standard Review Plan which acknowledges that it's appropriate for an applicant to submit certain background water quality information used for excursion monitoring and restoration after it receives its license.

I'll note that while the Standard Review Plan is not in itself binding on the Board, the Commission has stated that staff guidance is implicitly endorsed by the Commission and therefore is entitled the corresponding special weight. The citation for that statement is Yankee Atomic Electric Company, CLI-0529.

In addition, in Hydro Resources, that's CLI-0601, the Commission found that the staff may use license conditions to require licensee to submit additional information on water quality after it receives a license. As the Commission explained in that decision, the site-specific data to confirm proper baseline quality values cannot be collected until an in situ leach wellfield has been installed.

Finally, the intervenors also raise several additional claims regarding the methodology used to develop the baseline groundwater data that Strata did provide and the methodology and techniques they believe should be used to develop further

baseline groundwater data.

The staff addressed these various claims in its written testimony and looks forward to addressing these issues further today. Thank you.

CHAIRMAN BOLLWERK: Thank you. Just one reminder, that these mics are very directional, so make sure you have them down near your mouth. If you're too far away, not only will the court reporter have a hard time hearing you potentially, but Judge Cole as well, and he's a long way away. We want to make sure he hears. And the same thing would apply to the witnesses and we'll try to remind them as well. Thank you.

So the joint intervenors then?

MS. ANDERSON: Thank you, Your Honor, members of the Board. Shannon Anderson on behalf of the joint intervenors. First off, the joint intervenors want to welcome you to Wyoming. As you most likely noted on your site visit on Saturday, the Cowboy State is no stranger to energy development. However, in order to maintain the state's high quality of life and protect important natural resources, such as critical groundwater supplies, Wyomingites rely on agencies to take a hard look at the impacts of energy development and their work to prevent and mitigate

those impacts through their decision-making processes. And that is exactly what NEPA requires.

The law requires agencies like the NRC to carefully consider the foreseeable impacts of uranium projects before they take action. Unfortunately, as joint intervenors have explained in our briefs, and through the testimony of expert witnesses, in this case, NRC has not adequately considered some of the most important aspects of the project. Contention 1 is a prime example of the NRC's flaws in its NEPA analysis. Contention 1 centers on whether the NRC included enough data and analysis in its EIS to sufficiently characterize groundwater quality in the project area. Characterization of groundwater quality is necessary to assess pre-ISL project conditions, and in turn, to be able to analyze post-project impacts.

As Dr. Abitz explains, this analysis is a critical part of considering the impacts of an ISL project. Dr. Abitz' testimony shows that the data disclosed in the EIS cannot establish in a scientifically-defensible manner baseline water quality. And in fact, neither Strata nor NRC claimed that the information in the EIS is enough to sufficiently determine pre-project background water quality as required by Criterion 5(b)(5).

As discussed in the party's statements, NRC will rely heavily on a wellfield package that has yet to be submitted to determine water quality parameters for restoration targets and excursion prevention. However, as joint intervenors have argued, NEPA requires agencies to consider data like that before decisions are made, not after the facts.

To be clear, joint intervenors are not arguing that the full wellfield package of 100 plus wells is necessary to establish baseline conditions for NEPA purposes. However, as Dr. Abitz explains, NRC needs to do something more than they did in the EIS. And importantly, in order to fulfill NEPA's twin purposes, this data must be collected and analyzed as part of the Agency's decision-making process and subject to public review and comment.

As further support of the need to college this data now, Dr. Abitz' testimony explains why a post-decision collection, a baseline data could likely bias the results. Thus, from both the legal and a technical standpoint, additional baseline water quality data was needed for NRC's decision-making process.

As you just heard, NRC and Strata claim that the EIS contains a description of baseline water

quality sufficient to characterize pre-project conditions. Dr. Abitz has thoroughly rebuked this claim with testimony that shows that NRC's EIS does not include a scientifically rigorous data collection effort that used appropriate methodology to disclose and consider baseline water quality values. Dr. Abitz' testimony is based on his many years of experience working on a variety of different projects. Dr. Abitz is very familiar with the level of data necessary to establish statistically sound baseline conditions and explains a number of reasons why NRC's analysis in the EIS falls short of meeting that standard.

While Strata and NRC claim that the EIS merely needs to include a qualitative assessment of the affected environment, Dr. Abitz shows that a scientifically defensible quantitative analysis of baseline water quality data is exactly what is needed in this case. When it is critical in considering the information the Agency needs, and it's a decision-making process like it is here, NEPA requires scientifically defensible quantitative analyses.

For all of these reasons, NRC's EIS falls short of NEPA's requirements by failing to adequately consider the important aspect of Strata's ISL project,

baseline or background water quality in and around the project area. Thank you for your time and consideration.

CHAIRMAN BOLLWERK: Thank you very much. All right, at this point, Judge White is there anything you want to say before we begin? No.

Judge Cole, are you still with us?

JUDGE COLE: Still with you.

CHAIRMAN BOLLWERK: All right. Let's go ahead and start with SEI's witnesses for Contention 1 and I believe there are four of them.

MR. PUGSLEY: That's correct, sir.

CHAIRMAN BOLLWERK: Mr. Knode, am I pronouncing that right?

MR. PUGSLEY: Yes.

CHAIRMAN BOLLWERK: Mr. Demuth?

MR. PUGSLEY: Mr. Demuth.

CHAIRMAN BOLLWERK: Demuth, excuse me. Mr. Demuth. Mr. Lawrence, that one I got. Mr. Schiffer.

MR. PUGSLEY: That's correct, sir.

CHAIRMAN BOLLWERK: If you all gentleman can come up and go ahead and sit at the first table and sort of put yourselves in the middle. That will give the court reporter the best view of what's going

on so we make sure we get an accurate transcript. And hopefully, you're close enough to one of the monitors you can see if you need to although you may be able to see what's going on up there as well, if that's necessary.

All right. Let's go ahead and swear you gentlemen in. If you could raise your right hand. And I will ask you for an individual oral response to the following question. We'll start at this end of the table. Do you swear or affirm that the testimony you will give in this proceeding will be the truth, the whole truth, and nothing but the truth?

MR. KNODE: I do.

MR. LAWRENCE: I do.

MR. DEMUTH: I do.

MR. SCHIFFER: I do.

CHAIRMAN BOLLWERK: Let's go ahead and adjust the mics so you can get it right. It really works best when it's pretty close to you because these are very directional mics.

And so we then have three pieces, I'm sorry, four pieces -- hold on one second, let me get the right page. Three pieces of direct testimony, SEI001, SEI006, SEI026, and SEI005 and that's four pieces, I'm sorry. And then three pieces of a

rebuttal testimony, SEI047, SEI046 for both Mr. Demuth -- I mispronounced it again.

MR. DEMUTH: Demuth, Your Honor.

CHAIRMAN BOLLWERK: Demuth, Demuth. I'm going to get it in a second. Demuth. And Mr. Lawrence. And then SEI045 for Mr. Schiffer. So four pieces of direct testimony, three pieces of rebuttal testimony.

So first of all, let me ask all four of you and again, I need an individual response from each of you. The testimony that I just described, was this testimony prepared by you or under your supervision and direction and is it true and correct to the best of your knowledge and belief? And we'll start again on this end.

MR. KNODE: Yes, it is, Your Honor.

MR. LAWRENCE: Yes, it is, Your Honor.

MR. DEMUTH: Yes, it is, Your Honor.

MR. SCHIFFER: Yes, it is, Your Honor.

CHAIRMAN BOLLWERK: All right. Then let's go ahead and we're going to identify, we're going to go ahead and identify the testimony for the record, as well as the exhibits that accompany each one of these pieces of testimony. It will take us a second. And then we'll move it into evidence and then we'll come

back to you all and we'll start with a round of questions.

So now is a good time get a drink of water and relax because in a second, Judge White is going to have a few questions, I think, to start off.

Okay, so what we'll do now is do the SEI exhibits that relate to these four witnesses. I'm going to describe them very briefly for the record, identify them, and then we'll admit them into evidence. I will ask for objections after I've identified them. Having said that, no one really -- with one exception, lodge any objections I would be surprised to hear any now, but there is one final opportunity if you have a concern, although again, we did say that unless you've got something really good, these are late, ladies and gentlemen, because that was sort of the process that we set out.

Let's start out with SEI001 which is Mr. Knode's initial written testimony.

SEI002 which is his curriculum vitae.

SEI003 which is a diagram depicting air-lift development of ISR wells.

SEI004A which is an NRC July 10, 2009 memorandum.

SEI004B which is an NRC July 10, 2009

memorandum and supporting data. Some of these exhibits only go to Contention 1. Some go to all of the Contentions.

SEI005, Ben Schiffer's initial written testimony. And if you hear me saying anything wrong, let me know, all right?

SEI006 which is Mr. Schiffer's CV.

SEI007 which is NUREG 1569 Standard Review Plan for In Situ Leach Uranium License Applications.

SEI008 which is Reg. Guide 4.14, Radiological Effluent and Environmental Monitoring at Uranium Mills.

SEI009A and SEI009B which are the SEIS Volume 1, cover through Appendix B and then Volume 2, Appendix C to the end.

SEI010 which is the Safety Evaluation Report for the Strata Energy, Incorporated ISR Project.

SEI011, the Wyoming Department of Environmental Quality LQD Non-Coal Chapter 11 Institute of Mining.

SEI012A which again is the Wyoming Department of Environmental LQD Guideline 4 Institute of Mining, March 2000.

SEI012B which is the Wyoming Department of

Environmental Quality LQD Guideline 4 Institute of Mining for October 28, 2013.

SEI013 which again Wyoming Department of Environmental Quality, LQD Guideline 8, Hydrology.

SEI014A, B, C, D, E, F, G, H, I, J, K, M, N, O and P, all those again SEI014. Those are all the parts of the Ross Technical Report starting with Volume 1a and going through Volume 6e, Addendum 4.2b through 6.4a. And did I get all of them, did I mention them?

MR. PUGSLEY: Yes, sir.

CHAIRMAN BOLLWERK: SEI015 which is the NRC License SUA-1601 which is the license for the Strata facility, the Ross facility, I believe.

SEI016A and B and C and D and E, which are the Ross ER Volume 1. Starts with a Cover through Section 3.5 and SEI016E is the Ross ER Volume 3 Addenda 3.5A through 4.6A, basically the Ross Environmental Report Volumes 1, 2, and 3.

SEI017 which is the Ross ER RAI Responses.

SEI018 which is a Comparison between the Regulatory Guidelines and Parameters Analyzed by Strata.

SEI019 which is the Ross Ore Zone

Potentiometric Surface and Regional Monitor Well Location Map.

SEI020A, B, D, E, F, G which are the -- starts with the Preliminary Baseline Sampling Plan for the Ross In Situ Recovery Project and includes B, being Appendix C. C being Exhibit 1. D being Exhibit 2. Exhibit 3 is E. Exhibit 4 is F. And Exhibit 5 is G.

SEI021 this is the Wyoming Department of Environmental Quality Correspondence on the Preliminary Baseline Sampling Plan for the Ross ISR Uranium Recovery Project.

SEI022, the October 29, 2009 NRC Public Meeting Summary.

SEI023, February 17, 2010, NRC Public Meeting Summary. SEI024, the April 13, 2013 NRC Public Meeting Summary.

SEI014, the Baseline Groundwater Characterization Comparison to Other Licensed ISR Facilities in Wyoming.

SEI026, Hal -- I did it again. Can you pronounce your name for me?

MR. DEMUTH: Demuth.

CHAIRMAN BOLLWERK: Demuth. Hal Demuth and Errol Lawrence Initial Written Testimony.

SEI027, Hal Demuth, Curriculum Vitae.

SEI028, Errol Lawrence, Curriculum Vitae.

SEI029, Figure to Accompany Hal Demuth and Errol Lawrence Initial Written Testimony.

SEI030, United States Geologic Survey, Water Supply Paper 2220, Basic Ground-Water Hydrology, 1983.

SEI031, the National Mining Association's Generic Environmental Report in Support of the NRC's Generic Environmental Impact Statement for In Situ Uranium Recovery Facilities.

SEI032, a Typical ISR Process Diagram.

SEI033, the Pre-Licensing Well Construction, Lost Creek ISR Uranium Recovery Project.

SEI034, the EPA Aquifer Exemption Approval.

Then we're going to skip to SEI045. That would be the next one I have, is that correct?

MR. PUGSLEY: Yes, sir.

CHAIRMAN BOLLWERK: Contention 1. Ben Schiffer Rebuttal Testimony.

SEI0146, Hal Demuth and Errol Lawrence Rebuttal Testimony.

SEI047, Ralph Knode Rebuttal Testimony.

SEI050, FEIS for the Powder River Basin

Oil and Gas Project, Chapter 3.

SEI051, FEIS for the West Antelope II Coal Lease, Volume 1.

SEI052, FEIS for the Eagle Butte West Coal Lease.

SEI053, FEIS for the Maysdorf Coal Lease. And I believe that is it. Did I get everything for Contention 1?

MR. PUGSLEY: Yes, Your Honor. You did.

CHAIRMAN BOLLWERK: All right. So I've just identified for the record those exhibits. They are identified for the record.

(Whereupon, the above-referred to documents were marked as SEI001, SEI002, SEI003, SEI004A and SEI004B, SEI005, SEI006, SEI007, SEI008, SEI009A, SEI009B, SEI010, SEI011, SEI012A, SEI012B, SEI013, SEI014A, SEI014B, SEI014C, SEI014D, SEI014E, SEI014F, SEI014G, SEI014H, SEI014I, SEI014J, SEI014K, SEI014L, SEI014M, SEI014N, SEI014O, SEI014P, SEI015, SEI016A, SEI016B, SEI016C, SEI016D, SEI016E, SEI017, SEI018, SEI019, SEI020A, SEI020B, SEI020C, SEI020D, SEI020E, SEI020F, SEI020G, SEI021,

SEI022, SEI023, SEI024, SEI025, SEI026, SEI027, SEI028, SEI029, SEI030, SEI031, SEI032, SEI033, SEI034, and SEI045, SEI046, SEI047, SEI050, SEI051, SEI052 and SEI053 for identification.)

And then we're going to admit them into evidence. Anyone have any objections?

If not, then SEI001, SEI002, SEI003, SEI004A and SEI004B, SEI005, SEI006, SEI007, SEI008, SEI009A, SEI009B, SEI010, SEI011, SEI012A, SEI012B, SEI013, SEI014A, SEI014B, SEI014C, SEI014D, SEI014E, SEI014F, SEI014G, SEI014H, SEI014I, SEI014J, SEI014K, SEI014L, SEI014M, SEI014N, SEI014O, SEI014P, SEI015, SEI016A, SEI016B, SEI016C, SEI016D, SEI016E, SEI017, SEI018, SEI019, SEI020A, SEI020B, SEI020C, SEI020D, SEI020E, SEI020F, SEI020G, SEI021, SEI022, SEI023, SEI024, SEI025, SEI026, SEI027, SEI028, SEI029, SEI030, SEI031, SEI032, SEI033, SEI034, and SEI045, SEI046, SEI047, SEI050, SEI051, SEI052 and SEI053 are all received into evidence.

(Whereupon, the above-referred to documents were received into evidence as SEI001, SEI002, SEI003, SEI004A and SEI004B, SEI005, SEI006, SEI007, SEI008, SEI009A, SEI009B, SEI010, SEI011,

SEI012A, SEI012B, SEI013, SEI014A, SEI014B, SEI014C, SEI014D, SEI014E, SEI014F, SEI014G, SEI014H, SEI014I, SEI014J, SEI014K, SEI014L, SEI014M, SEI014N, SEI014O, SEI014P, SEI015, SEI016A, SEI016B, SEI016C, SEI016D, SEI016E, SEI017, SEI018, SEI019, SEI020A, SEI020B, SEI020C, SEI020D, SEI020E, SEI020F, SEI020G, SEI021, SEI022, SEI023, SEI024, SEI025, SEI026, SEI027, SEI028, SEI029, SEI030, SEI031, SEI032, SEI033, SEI034, and SEI045, SEI046, SEI047, SEI050, SEI051, SEI052 and SEI053.)

That will all be reflected in the record. Any questions? That's probably the worst one, hopefully.

All right, if there's nothing further -- anything from you Judge Cole at this point?

JUDGE COLE: No, not now.

CHAIRMAN BOLLWERK: Are you still awake? I'm sorry, I didn't mean to do that to you. Okay, let's go ahead and start with Judge White. He has some questions for the panel.

JUDGE WHITE: Yes, I'd like to start by defining some terms and getting some basic concepts

straight that we will be discussing with regards to this contention, as well as discussing with regards to future contentions. I understand all of this information is readily available in written testimony, so I hope you'll bear with you and get a few of these things so we all know what we're talking about when we use these terms.

One place to look is in the NRC license and on page 12, Section 11.3 it states "prior to injection of lixiviant in a wellfield, the licensee shall establish background water quality data for the ore zone, overlying and underlying aquifers. The background water quality sampling shall provide representative baseline data and establish groundwater protection standards and excursion monitoring upper control limits as describe in Section 5.7.8 of the improved license application in this license condition."

So we have three terms right in this paragraph, background water quality, baseline data, and excursion monitoring upper control limits.

Elsewhere, I believe on that page, we come across the term Commission-approved background. That's abbreviated CAB and the excursion monitoring upper control limits is abbreviated throughout many

documents UCL.

Can we get your idea of a brief definition of those four terms, background water quality, baseline data, excursion monitoring upper control limits, and Commission-approved background as they apply to the issues at hand?

MR. SCHIFFER: Judge, this is Ben Schiffer. And just as a background, I was responsible for the licensing of this project from basically 2005 to April 2014. And so I guess as a start in terms of the background water quality that's described in this license condition I think it's important to understand that the monitoring well infrastructure that would be required for that is something that is intense and a high density of wells would be installed. And I believe the best license condition talked to that in particular for the ore zone and the density which actually exceeds the density recommended in the SRP.

So in order to develop that, the wells are installed first in the ore zone interval at a density of one well per two acres. And then in the overlying and underlying at a density of one well per four acres, as well as surrounding the wellfield area. And that is at a distance of 400 feet from the area of the mining and at an offset of one another of 400 feet.

So those wells are installed. They are developed per the procedures that Strata has in place and the sampling of those wells begins. And that sampling is four samples with at least two weeks between them for a parameter suite that is defined in the license application. And I think in my testimony you'll find that that parameter suite is consistent with or in some cases in excess of what other licensees have for the parameter suite.

Along with that, there are quality assurance and quality control samples that are a matter of program for Strata to collect. For us, we collected at least, and I believe this will be consistent in the future at least, of one additional sample for every ten samples as a quality control and quality assurance and I think in my testimony, initial testimony, you'll see that we address at least on the pre-license how we look at quality assurance and quality control. So that, I think, is what we talk about particularly in terms of commission of proof background. From those, we would establish the upper control limits and that would be for the perimeter monitor wells, as well as for the overlying and underlying monitor well. And those upper control limits are based on three parameters that we have

identified that are consistent with guidance in terms of detecting an excursion. So that's the basis for those would come in.

We have a unique situation at Ross. The underlying interval has naturally high chlorites, so in lieu of chlorite as an indicator, we have proposed sulfate in this situation and that was acknowledged by the staff in their review.

So I think that gives you kind of the overview of how that background and particularly commission of proof background would be established for this project. Those data and this is, I don't know if you've ever seen one, but these wellfield packages are, in my experience, in excess of 300 odd pages. This is one component. Other components are obviously geologic and so forth, hydrogeologic potentiometric surfaces. But that's really a significant part of that wellfield package.

I think I've kind of lumped these things together and maybe if my colleagues have anything to add to that, but I've covered the bases there.

JUDGE COLE: Each well that you initially describe, these are called, these are also monitoring wells, right?

MR. SCHIFFER: Yes, Judge Cole.

JUDGE COLE: The wells that you described and they're the first wells that are really put in as far as the system, these are monitoring wells. Those wells are used to collect the basic data.

MR. SCHIFFER: Let me clarify a little bit for you, Judge Cole. I apologize. The wells that are completed at the density of one well per two acres in the wellfield area are typically used for in production as injection and recovery wells. So in a sense they are initially monitor wells, but they're also used by the operator during mining and restoration phases of the project.

JUDGE COLE: Thank you.

JUDGE WHITE: With regard to this, I understand that there -- and you've helped us understand that they're pretty strict definitions for the UCLs and for the CAB, Commission-approved background. And then they have specific purposes that are different from each other as you pointed out.

In general use for our discussion, is there any reason to distinguish the words background and baseline?

MR. DEMUTH: May I answer that question, Judge White?

JUDGE WHITE: Please do.

MR. DEMUTH: I think some of the nomenclature can be confusing, so I appreciate the question since it's so important for many of the contentions in this hearing. NUREG 1569 talks about the initial phase of the hydrogeologic characterization necessary for permitting. And the terminology that's used is baseline. And so it's a baseline groundwater characterization.

The term background ties into Commission-approved background which is in this case a license condition 11.3. That information is obtained from wells which are installed as part of a wellfield. Those wells per 10 CFR 40.32(e) cannot be installed prior to achieving a license. So the condition 11.3 Commission-approved background and UCLs, those are a post-licensing requirement. That is not referred to information that is gathered prior to obtaining a license during the application process.

JUDGE WHITE: Thank you. I'd like to take a look at a diagram SEI014H, page 462, 2.2-1.

MR. CRYSTAL: Your Honor, could I interrupt for just one second? I'm not sure I am going to follow the proper procedure in terms of noting a concern or an objection, but with regard to Mr. Demuth's testimony regarding the question of what

wells are permitted to be created pre-license or post-license, the joint intervenors have a different view of the legal aspect of that and have a concern about whether or not sort of testimony is being accepted as legal conclusions and we can sort of note that for the record as an on-going --

JUDGE WHITE: That's fine. These are fact witnesses.

MR. CRYSTAL: Yes, exact. We just want to note that disagreement, that's all.

JUDGE WHITE: That's it. Thank you. Okay, both FSEIS and the NRC license state and we've already heard testimony that the licensee shall establish background water quality data for the ore zone overlying and underlying aquifers.

Is it correct, referring to this diagram, that the overlying and underlying aquifer shown on this figure are indicated as the SM and DM aquifers, respectively?

MR. SCHIFFER: Yes, sir.

JUDGE WHITE: And the ore zone is indicating on the picture in green. Is that correct?

MR. SCHIFFER: Yes, sir.

JUDGE WHITE: Thanks. Understanding that this is just a schematic figure, not a detailed

geologic cross section, these squiggly blue lines on there, they indicate the regional direction of flow of groundwater in the ore zone. Is that correct?

MR. SCHIFFER: Yes, sir. This is a conceptual hydrologic diagram and it shows that infiltration at the outcrop. And if you'll remember your site visit, you kind of drove down the outcrop of the Lanson Fox Hills and that precipitation and infiltration enter the systems there and move into the Powder River Basin to the west in a natural scenario.

JUDGE WHITE: So that's a natural east to west flow generally or northeast to southwest flow?

MR. SCHIFFER: I would say naturally east to west, yes, it's east. Yes.

JUDGE WHITE: And then am I correct that groundwater pumping for industrial purposes or other uses can create local reversals in this general regional groundwater flow?

MR. SCHIFFER: Yes.

JUDGE WHITE: And finally, is the regional groundwater flow we see, is that equivalent to what is referred to as the regional hydraulic gradient which we see a lot of in testimony.

MR. SCHIFFER: Yes, sir.

JUDGE WHITE: Okay, good. If we look at

the FSEIS SEI Exhibit 009A on page 109, it states "Condition 11.3 of the Draft Source and Byproduct Materials License would require the applicant to install a monitoring-well ring around the perimeter of each wellfield, as well as monitoring wells in the underlying and overlying aquifers." And if we go on, it continues, it says "Prior to commencing ISR operations these wells would allow sampling and analysis of groundwater. That analysis would be used to establish groundwater protection standards called the Ross projects upper control limits or UCLs."

I'd like to focus on these perimeter wells and on the establishment of this background information that's going to be used for monitoring excursion. Am I correct that UCLs established from water sampled from the perimeter wells will be used as indicators for detecting lateral and vertical excursions after production has begun?

MR. SCHIFFER: Judge, in my experience, the perimeter monitor well system is used to detect horizontal movement away from the area of mining. So it's horizontal, but there is not a vertical component to that monitoring program.

JUDGE WHITE: But the monitoring wells will establish or sample water for background from

both the overlying and underlying aquifers as well, the DM and SM that we just saw?

MR. SCHIFFER: Yes, sir. The perimeter monitoring wells monitor horizontal and measure horizontal water quality away from the ore body and the overlying and the underlying. The wells installed in those intervals would characterize that water quality. So that would be the vertical, potential vertical movement to the overlying and underlying.

JUDGE WHITE: Right, so the monitoring well, in fact, will be able to detect by sampling the DM and SM whether lixiviant has migrated up or down from the ore zone aquifer and then moved out laterally. Is that what you're saying?

MR. SCHIFFER: Yes, sir.

JUDGE WHITE: What role, if any, do the background data from the monitoring wells play in establishing goals for post-production groundwater restoration?

MR. SCHIFFER: I should have been a little bit clearer in my previous response, but the wells installed at the density of one well per two acres in the wellfield area and that are eventually used for production injection are monitored to establish and it typically called restoration target values.

JUDGE WHITE: I will address those a little later.

MR. SCHIFFER: Okay.

JUDGE WHITE: Right now I'm trying to focus on the monitoring wells.

MR. SCHIFFER: Okay.

JUDGE WHITE: Do the monitoring wells, in other words, the background data, these geochemical analyses of water that you sample during your sampling program from the monitoring wells, do those analyses play any role in restoration of groundwater after mining is ceased?

MR. KNODE: Judge, could we be more specific so we understand. When you say monitoring wells, there's really four distinct top --

JUDGE WHITE: Sorry, perimeter --

MR. KNODE: Perimeter ore zone monitoring wells. Is that what you're --

JUDGE WHITE: Yes. The well perimeter, not the production or injection well. And all of the questions I want to ask for the next few minutes, deal with the perimeter wells, not with the wells within the well field per se.

MR. SCHIFFER: That's a good question, Your Honor. And I spoke to it briefly before, but

it's important to understand that the parameter suite that we have proposed and that has been approved by the NRC includes, is a very extensive parameter list. So we know the water quality of not only the excursion, the proposed excursion -- the approved excursion parameters, but we know very well the characteristics of that water quality. And so while they are not used to evaluate success of restoration, we do have that background established at that perimeter ring.

JUDGE WHITE: Right.

MR. LAWRENCE: Can I add one point of clarification?

JUDGE WHITE: Yes, please.

MR. LAWRENCE: The UCLs identify -- are the initial indicator of whether or not an excursion is occurring. Now we have a full suite of analyses for those perimeter monitor wells. If it turns out that the UCLs are exceeded and some type of corrective action is necessary, there's often sort of a phased approach where then you start to evaluate other constituents that you know the background values for to see if you truly have excursion occurring.

JUDGE WHITE: Right.

MR. SCHIFFER: It's important to

understand, too, that as part of the corrective action for an excursion if it has not been corrected within 30 days, then uranium is one of the parameters that we immediately have to begin monitoring for and that is by regulation and that's in Chapter 11 of LQD's Rules and Regulations.

JUDGE WHITE: Yes. Thank you. And many of these answers that you folks are giving are going to bleed into our discussions of Contention 2 as well, and because there's a lot of sort of connection between these topics, we'll be addressing them again.

For now and simply establishing background, not talking about what it's used for or how effective that is, let's see. For any particular wellfield will the perimeter monitoring wells be drilled prior to construction of the production and injection wells?

MR. SCHIFFER: I'd like to defer to Mr. Knode on that.

MR. KNODE: Could you ask that one more time?

JUDGE WHITE: Yes, I was wondering about the timing of both the construction of the perimeter monitoring wells as well as the timing of the sampling of the water that will be analyzed for background.

Will that be done prior to construction of the main wellfield?

MR. KNODE: Generally, the answer is yes with one significant caveat and that is there are these one well per two acres in the ore zone that are internal to mine unit that will be constructed at the same time as the perimeter monitoring wells and sampled at the same time as the perimeter monitoring wells as part of the wellfield package.

JUDGE WHITE: So all of the wells that will be used to sample water for various background purposes are going to be constructed and the water sampled prior to drilling the much larger number of wells that are going to be used for both injection and extraction of bore ridge water.

MR. KNODE: Correct.

JUDGE WHITE: Okay. Thank you. In your expert opinions, the geochemists in the group, will construction of the monitoring well ring by itself cause an increase in compounds both used for excursion detection, compounds in lixiviant, or an increase in uranium or other elements that are present within the ore minerals?

MR. DEMUTH: Judge White, in our experience we have not seen an adverse impact on water

quality due to monitor well construction at facilities for which we've been involved.

JUDGE WHITE: We'll talk more about that when we talk about the monitoring wells in the wellfield itself.

How would SEI ensure that water collected from monitoring wells for the purpose of establishing monitoring background does not already contain some anomalous concentrations of lixiviant indicators owing to the presence of lixiviant left over from the Nubeth operations of the late 1970s? In other words, you were saying that the primary indicator of an excursion would be chemical compounds that would be present in lixiviant, but we know that there's been previous ISL operations that have injected lixiviant, so is there some way to ensure that you're not already collecting baseline that has some of these lixiviant components in it?

MR. SCHIFFER: Judge, I'll take the first pass at that. And I guess it's important to understand Exhibit SEI 19 clearly depicts the withdrawals over the past 30 years, as you have alluded to, have induced a local drawdown in that system. And those wells, and I could be corrected, but I believe they pump approximately 30 to 40 gallons

a minute and they've done that over a long time. We see the effects of that. So in my mind it would be virtually impossible for there to be any relevant impact of that one five spot pattern today. So I think that is not a consideration in my experience.

In terms of getting representative samples and I think Ralph and the other experts can talk to this probably better than me, but we have an environmental management plan that will be reviewed by NRC during their preoperational inspection. And one component of that is how we develop our wells and how we demonstrate that a sample is truly representative. And so there are number of water quality criteria that we utilize in the field when that development is occurring. And in my experience, the key one is obviously pH. We want to demonstrate that the pH is representative. We also measure electrical conductivity. We measure temperature and we will periodically measure turbidity as well to demonstrate that the water is representative. So that is the first element in quality control check on how those wells are developed. And I think that's important. And that is part of the -- will be part of the preoperational review of this project by NRC.

I didn't know if you all had any more to

add to that.

MR. LAWRENCE: One other point is that it's repeated sampling. It's sampling multiple times to demonstrate that you've got a certain consistency in the water quality, so that's another criteria that you use to establish that you have representative samples.

JUDGE WHITE: How long of a period does the sampling from the perimeter monitoring wells, in other words, over what period are they sampling?

MR. SCHIFFER: We have and it's basically -- the samples have to be separated by at least two weeks. So that's the consideration. More often than not, it's -- as long as they're separated by two weeks, and we cover them as we can get to them during the sampling program.

JUDGE COLE: And the length of the sampling program is what, two years for each sample? So what? This is Dr. Cole.

MR. SCHIFFER: Dr. Cole, in my experience and I think Ralph can talk to this better than me, but really it's a matter of logistics in terms of getting to this number of wells over a certain period. They're being installed and the pumps are installed and developed and sampled. The duration could last --

Ralph, maybe you could weigh in?

MR. KNODE: Judge Cole, this is Ralph Knode. I think the two-year period you may be referring is the initial establishment of baseline water quality throughout the project area --

JUDGE COLE: That's what we were talking about.

MR. KNODE: I thought that Dr. White was asking about the perimeter monitor wells associated with the individual wellfields.

JUDGE WHITE: That's correct.

MR. KNODE: So if I can just maybe elaborate, Judge Cole, yes, the two-year period is -- one of the two-year period -- is the initial water collection period for the broader baseline water quality. What I believe Judge White was asking about is the -- the time period over which the sampling would take place to obtain water quality information from the perimeter monitor wells?

JUDGE WHITE: Yes.

MR. KNODE: Once those wells are installed and developed and can be shown to be an accurate representation of the water in the aquifer, then the sampling starts, as Mr. Schiffer said, at a minimum of two-week intervals and a minimum of four samples. So

it could be as short as eight weeks, but realistically it is probably something slightly longer than that.

JUDGE COLE: At that time, they're used principally to identify excursions, is that correct?

MR. KNODE: Yes. Once that water quality is established, as I just described, then those wells would be used for identifying excursions. That's correct.

JUDGE WHITE: If we look at this very simple picture of a typical wellfield that's included in the technical report, SEI014C, page 63, we see -- that diagram would show a group of -- this is not a representation of necessarily any real one, but one that is used for illustration of what a typical wellfield would be like, is that correct?

MR. KNODE: Yes. That would be a representation of what a wellfield might look like, correct.

JUDGE WHITE: And we can see the squares with the Xs in them would be the perimeter monitoring wells?

MR. KNODE: Correct. The perimeter monitoring wells that are on the ore zone, yes.

JUDGE WHITE: Okay. Are all of these wells -- well, scratch that comment. Given regional

hydraulic gradient, if this were representative of one of your wellfields and the regional hydraulic gradient is moving groundwater through the ore zone from east to west, then would it be correct to say that the monitoring wells on the east side of the wellfield would be up hydraulic gradient?

MR. DEMUTH: Judge White, if I could answer that? The monitoring well ring for a proposed wellfield would entirely circle the proposed ore body.

JUDGE WHITE: As we see in this diagram?

MR. DEMUTH: Right. And so in the sense of regional groundwater flow, yes, you would have some monitor wells that would be on the upgradient side from a regional flow standpoint and some wells that would be on the downgradient side.

MR. KNODE: That won't be the case once they're put into operation, Judge White. Once the operations start and there's a bleed taken from that wellfield overall, everything becomes upgradient.

JUDGE WHITE: That's --

MR. KNODE: If you're referring to prior to any operations, you are correct, yes.

JUDGE WHITE: And I understand that the -- and we'll be talking about this later, but that the mining design creates a hydraulic gradient and that

draws in water, at least it's designed to draw in water.

(Announcement from Operator.)

CHAIRMAN BOLLWERK: We're ready.

JUDGE WHITE: Okay. I'm almost done with these perimeter wells. Although the perimeter monitoring wells are situated outside the areas of minable ore, would you expect background concentrations of uranium and water sampled from the OZ aquifer to vary from well to well? I mean we've already said that we're sampling prior to mining, sampling water for background. The upgradient side may be different from the downgradient side.

Would the concentrations of ore minerals, for example, from one well to another be different and not to affect significantly the concentrations of uranium in water sampled from the monitoring, the perimeter ring monitoring wells? I can restate that if it isn't clear.

MR. LAWRENCE: I think I understand the question, Judge White. Yes, obviously, depending on where that well is located, you may have considerably different concentrations of a wide range of constituents. As you have seen in some of the diagrams, the ore bodies themselves are very

irregularly shaped and so depending on where you might be relative to that ore body, it can certainly change the -- or have a different concentration in the water.

JUDGE WHITE: Okay. We'll get into the details of how these monitoring wells operate later. But would that fact that baseline collected from the perimeter wells could vary significantly in uranium, would that argue against using uranium as an indicator for an excursion?

MR. LAWRENCE: Uranium is not typically used as the initial indicator of an excursion. The UCLs are more commonly alkalinity, conductivity, and in this case sulfate.

JUDGE WHITE: Yes.

MR. LAWRENCE: So that's exactly the reason why uranium is not typically used.

JUDGE WHITE: Okay, I understand that.

MR. DEMUTH: Judge White, if I could add to that, part of the reason for the perimeter monitor wells is to monitor for the most conservative species, i.e., those of which are the most mobile.

JUDGE WHITE: Yes, we'll certainly get into that as I understand that's a matter of debate also. I'd like to explore that later on. But I think we'll be exploring that in Contention 2.

Finally, the last thing I wanted to ask, water will be sampled from both the aquifers above and below the OZ aquifer during this sampling period where water is taken from the perimeter monitoring wells. Are separate UCLs determined for each of the three aquifers for the upper, lower, and ore zone aquifer?

MR. SCHIFFER: Yes, Judge.

JUDGE WHITE: Okay, good. We can move on to a slightly different topic or when do you want to take a break?

CHAIRMAN BOLLWERK: It's about 11 o'clock. I think we've been going about an hour and a half now. It may be a good point to take at least a brief break and let everyone get up and stretch their legs and use the restroom if they need to.

One thing I will talk with counsel briefly when we come back is lunch plans, if you have any, in terms of what you might be thinking about so we can get some sense of how long we need to take for our lunch break. So if you know what you're going to do, share that with us and we'll talk about that a little later.

It's about 5 'til 11. Let's take about a 10-minute break until around 5 after 11.

(Whereupon, the above-entitled matter went

off the record at 10:56 a.m. and resumed at 11:10 a.m.)

CHAIRMAN BOLLWERK: All right. Let's go back on the record, please.

We've just finished our brief morning break and one question I guess I wanted to raise with the parties before we begin with Judge White's questions is about a lunch break. I understand one thing we need to avoid is apparently the time period from right about now, or a little bit before now to afternoon time because apparently the high school here has open campus and everybody takes off and apparently, at least down the street where a lot of the fast food restaurants are, it's chaos down there for about an hour. So we wouldn't take a lunch break until after 12:00 in any event.

But my other question I guess relates to is are your plans to leave the building? Obviously there's nothing here unless you bring it here. So are people planning on leaving the building and going down for lunch or do you have things coming in, or what is everybody's sort of status, I guess?

MS. MONTEITH: Your Honor, the staff is planning to spend lunch here.

CHAIRMAN BOLLWERK: Okay.

MR PUGSLEY: Same here.

CHAIRMAN BOLLWERK: All right.

MS. ANDERSON: We could do that if we need to.

CHAIRMAN BOLLWERK: I mean, could you have -- I mean, you're going to bring --

PARTICIPANT: We're going to go get something and --

CHAIRMAN BOLLWERK: Bring it back? I mean, the question is can we do lunch in about an hour? Do we need an hour-and-a-half? I guess that's my thing. I want to give you all enough time to eat, but I also want to be as efficient as we can. That's my point.

PARTICIPANT: The staff would be fine with an hour.

MR. PUGSLEY: And hour is fine.

CHAIRMAN BOLLWERK: Does that work with you all? Okay. All right. Let's try and hour and if for some reason it doesn't work this time, we know for tomorrow and the next day that if we need to take a little more time, we'll do that. Because again, I want to give you enough time to be able to at least get something in your stomach, but we do want to try to be as efficient as we can.

So, okay. At this point, Judge Cole, just as a reminder, when we've had all the questions for this particular panel, we will be taking a break so that the parties can provide us with any cross-examination questions. Then we'll have to take another break off of that to talk about those questions and decide which we will or won't ask. So that may be coming up in -- I don't know when, but that would be one of the next procedural steps we'll have. So this is a reminder. Okay?

All right. Judge White?

JUDGE WHITE: Yes, the previous questions that I've been asking, just to summarize, have been dealing specifically with the perimeter monitoring wells and background values that will be established from those wells which are used for excursion monitoring.

I'd like talk now about -- ask you and have you talk about the background values that will be established within the wellfield itself that will be used for restoration standards. And I hope you'll clarify if I'm misrepresenting where we're going with these.

Okay. As stated previously in your testimony here, background data determined from water

sampled from wells within the wellfield prior to operations beginning will be used to establish goals for groundwater restoration after production has ceased. Is that correct?

MR. KNODE: That would be correct, yes, sir.

JUDGE WHITE: Yes. In addition to establishing background values for restoration of the OZ aquifer are backgrounds also determined for the SM and DM aquifers above and below the wellfield per se that are also used to establish restoration standards for these aquifers, if needed?

MR. SCHIFFER: I'll take a first pass at that, Judge. And I think it's important to clarify here that the wells installed in the SM and DM interval will be monitored for the extensive parameter suite that's been approved by the NRC staff and it includes parameters well beyond those that would be used to establish the UCLs, so that background will be there. But really the intent of that monitoring effort is to establish those UCLs for excursion and excursion monitoring and not necessarily for restoration.

It's important to note that in the event that there is an excursion into an overlying or

underlying aquifer that throughout the restoration that that well would have to be monitored for those parameters to demonstrate that it too was brought back to the restoration standards established. And that would be the same for a perimeter well that goes on excursion.

And so, in addition to that, if the area and the volume that would be impacted by that excursion would also have to be bonded for to cover the restoration. So in the event of an excursion that parameter suite would be monitored throughout the -- until that is corrected.

JUDGE WHITE: And that would take place at the perimeter monitoring?

MR. SCHIFFER: Perimeter as well as the overlying and underlying if it were not corrected.

JUDGE WHITE: I'd like to take up this issue of the screening interval that is sampled. And I know interveners raised an issue about the screening interval for the pre-license site characterization from the well clusters, but there's also been some concern about the screening interval for the wells within the wellfield that are going to be sampling water that will be used to establish the Commission-approved background. So if we can address that a

little bit, that's where I'd like to hear from you.

And what I'd like to look at is the rebuttal testimony of Mr. Schiffer, and that's SEI-045, page 14, answer 10. And in this rebuttal testimony you have statement in which you're addressing the question of the sampling interval used in the pre-license site characterization and you're rebutting an issue that that sampling interval was too small. And in the first sentence you state that in fact it is more likely that the water quality from the OZ aquifer sampled in the regional baseline monitor wells is actually diluted compared to the water quality in the mineralized zone since these wells all were screened across intervals larger than the average mineralized zone thickness.

And so, am I correct that what you're saying is that the screening interval for sampling water for the site characterization study is larger than the mineralized zone thickness?

MR. SCHIFFER: Yes, Your Honor. In this case we screened those wells over a larger interval in order to characterize the extent of that OZ aquifer. And so, we were not specifically looking at intervals of mineralization or focusing on that. And in that regard, if we could look at SEI-19, you'll see that in

addition to that we were looking at areas both within and outside of the mineralized areas.

JUDGE WHITE: All right. Did that statement imply that -- well, let's see. Did that statement mean to imply that you expect groundwater within the narrow mineralized zone to contain measurably greater concentrations of uranium and radium-226 than the water above or below those zones?

MR. SCHIFFER: Your Honor, I'm not sure that it meant to imply one, that that -- that one or the -- that that's the case. I think in my experience that that is typically the case, that the intervals that have the mineralization do have unique water quality characteristics. And I think that's fairly common. And others may be able to weigh in more, but, yes, I think that is the case.

JUDGE WHITE: Yes, and I was referring to your implication when you say that -- you used the words "diluted," and that sort of implied that you were saying that the water above and below probably diluted the contaminant concentrations.

With regards to this, Judge Cole, do you want to put in here?

JUDGE COLE: No, not at this time. With respect to the screening, I don't have any feelings

for that situation.

JUDGE WHITE: Okay. The samples that are collected for the Commission-approved background post-license but prior to the beginning of operations from the wells that you've discussed previously, will those samples be screened through the narrower interval that you discussed in that statement that we just read?

MR. SCHIFFER: So let me make sure that I understand the question. We started out talking about the overlying and underlying at the SM and the DM, but now we're talking about those wells that are installed to establish Commission-approved background in the mineralized portion, correct?

JUDGE WHITE: Yes.

MR. SCHIFFER: So in my experience; and I think these gentleman can probably talk to this a little bit better, but in my experience those intervals, those completions are typically discrete to the mineral.

I mentioned earlier that those wells in an operational scenario can be used for injection and recovery wells, and at least in my experience you generally want those wells to be focused on the mineralization. And that's the approach that's taken. Exposing the enriched groundwater to portions of the

aquifer that don't have mineral really is potentially a waste of the reagents of the oxygen and the bicarbonate.

JUDGE WHITE: I understand that. So the reason for sampling a narrow interval within the mineralized zone to establish background for restoration standards is that that's the screening interval that you'd be using later on once production begins for mining?

MR. SCHIFFER: Yes, Judge.

JUDGE WHITE: Is it fair to say then that the water quality of the samples that will be collected to be used for post-mining restoration are likely to have the highest contents of contaminants of any of the water within the OZ aquifer?

MR. SCHIFFER: Yes.

JUDGE WHITE: Is there a reason other than the fact that it would be I assume economically a bit more difficult to collect your water samples to establish CAB from a larger screened interval that would give a more accurate picture of the average water quality of the OZ aquifer?

MR. SCHIFFER: I think the intent of using the potential or the future operational wells is that you're establishing Commission-approved background

using wells that target that specific interval of uranium. And that to try and establish CAB over an interval that would be outside of the roll front interval will misrepresent the water quality that you need to get back to following mining.

JUDGE WHITE: But isn't there hydrologic connection between the groundwater within an interval that might only be a few meters thick and the groundwater in the OZ aquifer that's above and below the mineralized zone?

MR. SCHIFFER: And I think Ralph may be able to expand on this, but in my experience the roll front and the mineralization is in a large part driven by local changes on that ore zone so that it's there and it's in these discrete, say 10-foot intervals based on local variations in the entire aquifer. And so therefore, the mining really focuses on that interval and not those above and below. And really the intent of the mining -- and if you look at the diagram; and I believe we have one that shows how the mining wells are normally completed in a schematic, you look to see that we're really trying to target those portions of the ore body that have the mineralization.

JUDGE WHITE: I understand that that's the

efficient and the very logical way to proceed when you're mining. What I'm addressing is whether that's the most effective way to take a sample that you're going to use to restore the groundwater quality in an aquifer in general. And I don't want to dwell on it too long, but my question would be are you looking to only restore two meters of that aquifer, or when restoration takes place are you going to be restoring the water quality of the -- maybe not the entire thickness of the OZ aquifer, but certainly more than just a meter or two of the OZ aquifer? Do you understand what I'm getting at?

MR. DEMUTH: May I attempt to answer that, Judge White?

JUDGE WHITE: Please.

MR. DEMUTH: I think when you take a water quality sample and establish Commission-approved background in that, what we're referring to as a smaller screen interval, what you're doing there is you're documenting the water quality in the area, that portion of the aquifer which you are going to disturb during mining. So it makes sense to me then you don't want to take a sample from a much broader -- and vertical sense a broader sample because you want to look at that area that you're impacting in your

screening intervals, and that is what you're looking to restore. So to influence that water quality by a 100-foot screen versus a 5-foot screen, I don't think that's what you're trying to accomplish.

MR. SCHIFFER: Judge White, if I could add to that? I think it's important to note that in terms of analyzing the success of restoration it's important to understand that the calculations for the pore volume -- and we haven't gotten to defining that term yet, but I think it's fairly well understood that we're looking at a volume of water that's going to be restored. And that's a metric that we use.

It's important to understand that when we look at in particular on the licensing side and the permitting side that we have a flare factor for how that pore volume is calculated. And that accommodates both a horizontal component as well as a vertical component of that affected aquifer. And that in a lot of ways I believe captures the concern that you have here. And it varies by project, but there is certainly a vertical flare component to those calculations that capture the amount of water above or below that particular mining interval that may have been impacted during mining.

JUDGE WHITE: Judge Cole, do you want to

weigh in?

JUDGE COLE: Yes, well certainly during operations when you're trying to drain them from that area you would want the screen located such that the concentrating area of flow with the input that you're only -- you're collecting the maximum amount in contact with the uranium area so that you would be able to concentrate that area and collect it much faster. Is that a fact?

MR. KNODE: Yes, you want to have the screen intervals to focus your solutions on the ore zone only and not other portions of the aquifer that don't contain ore. And I believe that's what you were alluding to, Judge Cole.

JUDGE COLE: Yes.

JUDGE WHITE: I guess that's clear about what the plan is.

The final thing that I wanted to ask is about this issue of the effective wellfield construction on water quality sampled for a baseline. And you're well aware that interveners have asserted that construction of a wellfield during conventional drilling methods would by itself likely cause a measurable increase in the concentration of uranium in the groundwater within the ore zone owing to an

increase in the oxidation state. In other words, the drilling by itself introduces oxygen or other compounds into the groundwater that raises oxidation state. If this were accurate, then the background values used to guide aquifer restoration would be artificially biased toward greater concentrations.

In your opinion is it feasible that uranium concentrations in groundwater could be measurably increased by using conventional drilling methods to construct the wellfield?

MR. KNODE: In my opinion that's not the case, sir. There are examples of that that you could go and look at. One that comes to mind is when you're installing this wellfield monitoring network, you have to put in a large number of wells and you sample those wells and you will continue to sample those wells over the life of the production, life of the restoration. And there's never been in my experience a situation where you have seen because of the initial drilling of those wells and then the subsequent drilling of many more injection and production mining wells. I've never seen a situation where there's a noticeable increase in things like uranium because of that subsequent activity of mine installation. And my testimony speaks to that.

MR. DEMUTH: Judge White, if I could add to that? In our experience; we worked at many, many ISR facilities in Wyoming and Nebraska, Texas, we have not seen an impact on baseline water quality in any fashion in a way that Dr. Abitz speaks to in his testimony.

In addition, STRATA has provided a comparison of groundwater quality over time from the wells that they've installed and we have not seen a variation in that either. The drilling process simply does not induce sufficient oxygen in a small diameter bore hole to impact the geochemistry of an entire aquifer system.

JUDGE WHITE: Okay. Can I just you to clarify, who is "we?" I'm sorry. You said "we."

MR. DEMUTH: Petrotech Engineering as consultants to many ISR operators in the U.S.

JUDGE WHITE: Okay. Thank you.

I think those are my questions for STRATA's witnesses.

CHAIRMAN BOLLWERK: All right. Judge Cole, did you have any questions for these witnesses?

JUDGE COLE: Well, one question that could be answered by either of the groups. It has to do with the perimeter monitoring well ring and how is the

size of the perimeter monitoring well ring determined. I think I know, but I'd like to have somebody speak to that.

MR. SCHIFFER: I'll take a pass at that, Judge Cole. And in this situation what we did is actually develop a site-specific groundwater model that brought in characteristics of the aquifer as measured in at least seven aquifer tests, as well as a model that captured the 30 years of withdrawals from the industrial wells. We took that model and we actually developed an in situ recovery wellfield. I believe it was an exhibit that was brought up previously, and I apologize for not remembering the exhibit number, but maybe we could bring it up again, that shows that wellfield.

And I can talk a little bit. Understand I did not develop the model, but I will say that what we did is we put into the model injection and recovery wells, we balanced the wellfield in the model and then we simply simulated an excursion. And in doing so, what we were able to do was establish how quickly that the changes in water level; and water level is something that we measure every time we go to one of these perimeter wells in the course of monitoring every two weeks, and we're able to demonstrate that

from distances of 400 to 600 feet that that excursion could be detected. And so really that's the basis for it.

I believe that as we move further into this and particularly in Contention 3, we can get into more detail about the modeling, but really we used a site-specific model, we used an example of an wellfield scenario; and I can't recall how many injection and recovery wells there were, and simply induced an excursion and then used the model to tell us when we would see that response in those perimeter wells at a given set of distances. And in fact, I believe we could detect an excursion to 600 feet. We have elected to go the more conservative route and that perimeter ring is 400 feet from the wellfield area.

MR. LAWRENCE: Judge Cole, if I might add? This is Errol Lawrence from Petrotech. I did an independent review of that model and I've actually developed several models for other ISR sites. And the methodology used in that modeling was consistent with what's been used at other ISL/ISR facilities. And so the approach is standard and it's an approach that the NRC has accepted repeatedly.

JUDGE COLE: The perimeter monitoring well

ring, how many different well packages are included within the perimeter monitoring well ring? All of them, or do you do a monitoring ring for each individual well package?

MR. LAWRENCE: That's correct. So each additional wellfield would have its own wellfield data package and its own independent perimeter monitoring network.

JUDGE COLE: And you determined that so many feet distance was a reasonably safe distance so that you were not interfered with by other abandoned or un-abandoned wells in the area?

MR. LAWRENCE: Well, the determination of whether or not you had abandoned wells would be developed prior to the wellfield data package being submitted. It would be part of the pump testing that would be done for that particular wellfield, as well as reconnaissance and -- basically site reconnaissance identifying abandoned bore holes. So it would be a little bit different issue.

MR. SCHIFFER: Judge, if I can expand on that? One of the key elements of the wellfield package would be to demonstrate that all of the perimeter monitor wells respond to pumping within the wellfield area. That is a critical metric that must

be met. And that wellfield package, as you may know, would go to NRC as well as the State of Wyoming for review and approval at the state level and review and verification at the NRC level. So understand that while the distance for this project has been set, that those wellfield packages would have to demonstrate that those perimeter monitor wells all respond to a stress; i.e., pumping within that wellfield area.

JUDGE COLE: Well, the reason why I'm concerned about this area is because we've got a couple of thousand wells out there, not all of which are properly sealed. And in the process of the well package you will identify hopefully any wells that are not properly sealed that would interfere with the operation of that well system. Now, how many wells do you think would be involved in the packages, the well systems that you've developed, because the numbers are very small, relatively small number compared to the total that has been identified and fixed.

MR. SCHIFFER: I'll take a first pass at that, Judge Cole, and understand that we have a specific license condition that requires that we identify and reabandon all of the exploration holes that were drilled in the past within the perimeter monitor well ring prior to conducting the tests that

would demonstrate the communication with the perimeter monitor well ring as well as the lack of communication with the overlying and underlying intervals.

In terms of the numbers of holes that are present, I'm going to defer to Mr. Knode who has those well in hand.

JUDGE COLE: Okay. Well, but how far does the well have to be to demonstrate communication?

MR. DEMUTH: Judge Cole, Mr. Demuth. If I could weigh in on this issue? The situation we have here, as we've discussed I think in our testimony, is common, where we have multiple historic bore holes. In I believe Contention 3 we're going to get into more detail on that.

I'm not aware that we have conclusive evidence of holes that are improperly plugged at this point. We are aware that STRATA has located a great number of holes. We are aware that STRATA has conducted pumping tests which demonstrate the integrity of the confining zones. And certainly in our experience we have conducted many pump tests at over 40 wellfield and in regional tests just in our company alone.

In some of those we have identified wells that in fact were a problem. Those wells have been

subsequently plugged. The vast majority of those, even for sites with thousands of historic wells, we have found that the enormity of cases that they do not present a problem.

JUDGE COLE: Thank you.

CHAIRMAN BOLLWERK: Anything further you have?

JUDGE WHITE: Nothing further.

CHAIRMAN BOLLWERK: All right. I think the questions that I have potentially for this panel I may defer until the end when we perhaps have everyone back up. So at this point I think we have concluded with our questions for you all at this point. You may be relieved of your seats at the witness table, but subject to being recalled, obviously. So --

JUDGE WHITE: And thank you for your responses.

CHAIRMAN BOLLWERK: All right. At this point we will take a -- would 15 minutes be enough for you all to generate any potential questions you want to ask -- have us ask, rather, of this panel?

Actually, I should say one thing: Why don't you stay there because we need to find out what the cross-examination questions are. I apologize.

So if we take a 15-minute break, is that enough time for you all to generate whatever you might have?

MR. PUGSLEY: Yes, Your Honor.

CHAIRMAN BOLLWERK: Okay. And again, however you can present them to us -- we'll take them handwritten, we'll take them typewritten, however you've got them, but as long as they're readable. That's the main thing. Thank you very much.

(Whereupon, the above-entitled matter went off the record at 11:43 a.m. and resumed at 12:00 p.m.)

CHAIRMAN BOLLWERK: We've taken a break to allow the parties an opportunity to provide with proposed cross-examination questions for the SEI panel on Contention 1. And each of the parties has provided us with some questions, proposed questions.

Just as a procedural matter I'll mention one more time that these questions, as well as all the questions that you all provided us for both the direct pre-filed testimony and the rebuttal testimony will be preserved for the record. While we don't put them on the record until after we issue the initial decision, they are preserved and will be placed there at that point so they will become a matter of public record.

So what we're going to do now -- because normally we would simply pick ourselves up and probably go behind that wall and talk for a couple of minutes. But Judge Cole is remote, we're going to be going into our space we have over there, contacting him. We're actually trying to -- we've scanned and -- or trying to email him the questions so he can actually have them in his hand as he looks at them. So we're going to need a couple of minutes. And we will come back and see -- we want to make a decision about which questions we will or won't ask.

Also, as a procedural matter, just let me apprise you, I think what I would plan to do after we've done with whatever questions we're asking this panel is to go ahead and impanel the staff witnesses, get the evidence in that -- the testimony and the exhibits that support it and then probably take our lunch break and we'll start fresh with the staff panel after lunch with all the procedural items out of the way. So that's kind of where we're headed.

All right. So we'll go ahead and take a break. Hopefully we will not be more than 15 minutes and we'll be back. And then we'll proceed from there. Thank you.

(Whereupon, the above-entitled matter went

off the record at 12:02 p.m. and resumed at 12:22 p.m.)

CHAIRMAN BOLLWERK: So apparently the NRC figured out how to fix my phone in my office so we can talk to Judge Cole. And we have several questions we would like to pose to the panel based on what we received.

The first question is: If you only screen the ore zone but admit that the pore volumes account for vertical and horizontal migration of mining fluid beyond the ore zone, then is that truly a representative sample of the aquifer zone that is affected?

And I can repeat that if you want me to.

MR. KNODE: Please.

CHAIRMAN BOLLWERK: One more time. If you only screen the ore zone but admit that the pore volumes account for vertical and horizontal migration of mining fluid beyond the ore zone, then is that truly a representative sample of the aquifer zone that is affected?

MR. KNODE: Okay. It is correct, as we discussed earlier today, that we do only screen the ore zone. And what's going on between a production well and an injection well is primarily horizontal

flow with a very small component of vertical flow. And so, what we are establishing Commission-approved background on is that screen interval, that vertical interval, and that interval is what we're going to effect during the mining operation. And that same interval is what we're going to effect or restore during the restoration phase of the operations so it makes sense to me that that would be the same vertical interval that you would establish Commission-approved background on.

MR. SCHIFFER: If I can quickly put a point on that? Yes, we believe it is representative.

CHAIRMAN BOLLWERK: All right. Anything, Judge White, you want to add at this point, or should I ask the next question?

JUDGE WHITE: Go ahead.

CHAIRMAN BOLLWERK: All right. The second question is: Again, this deals with screening. Would screening monitor wells within the full ore zone create operational problems?

I'm sorry, I think I read it wrong. Let me try again. Would screening monitoring wells within the full ore zone create operational problems? One more time?

MR. KNODE: Yes, it would.

CHAIRMAN BOLLWERK: Okay.

MR. KNODE: Because when you go in and install the mining well component of your wellfield, you have these very distinct intervals that you want to operate in. So you would be forced with trying to figure out the logistics of in the same well screening a very large zone, sampling that and then coming back and screening a very small zone. And that's not practical, in my personal opinion.

MR. LAWRENCE: Plus you would also add an additional pathway. There are concerns about things such as abandoned bore holes. Well, in this case you would actually be creating a conduit up to other portions of the aquifer that you don't want to impact while you're mining, so it would be kind of counterproductive in terms of trying to maintain your fluids within the ore zone.

JUDGE WHITE: I have no engineering experience in constructing production wells for anything. So are you saying that if you construct a well that is screened through the full aquifer in order to collect a water sample to establish background, then you would have to completely re-engineer that same well?

CHAIRMAN BOLLWERK: I think you may not be

close enough to the microphone.

JUDGE WHITE: I'm sorry. Yes, excuse me. To repeat: If you constructed a well that was screened through say 100 feet of the OZ aquifer or however thick -- 150 feet I guess is the average thickness -- screened through that entire thickness and then you wanted to convert that well after you did your water sampling to a well that's going to be used for mining in which it had a much narrower screen, right, what would that involve? Would that involve basically constructing an entirely new well, or is there a way that you can pull the casing and change the -- I mean, I don't understand the engineering behind it. So you're saying it's completely unfeasible to do such a thing. Why is that unfeasible?

MR. LAWRENCE: You could go in and reconstruct the well, but then to go back and make that useable to monitor the entire interval wouldn't be practical. You couldn't go back and forth.

JUDGE WHITE: No, no.

MR. LAWRENCE: Yes.

JUDGE WHITE: But you wouldn't. I'm not talking about monitoring. I'm talking about collecting the initial baseline water sample that's

used to establish CAB and then go back, make your well so it works for your mining purposes. And then restoration time comes when mining is all done, refit it again. So you'd only really be doing it twice so that you'd be looking at water quality. You'd be comparing apples with apples. You'd be comparing the water quality of the entire OZ aquifer before you started mining. Then you'd reduce it down, make that into a useful well for your purposes. And then when you're all done years later make that -- because I know you're going to use the same well to establish your post-mining water quality, then re-screen it back up to a big interval and then look at that again. And then you'd be comparing apples and apples.

MR. LAWRENCE: Right.

JUDGE WHITE: From an engineering standpoint is that completely unfeasible to do such a thing?

MR. KNODE: Can I suggest that we look at SEI-003?

CHAIRMAN BOLLWERK: Just one second. We have to put a password into a computer. Hold on.

JUDGE WHITE: I'm asking this because I think it goes to the question that's being asked.

CHAIRMAN BOLLWERK: What's happened is we

were trying to -- unfortunately the NRC computers that we're using about every 30 seconds will come up with a screen that you have to keep reentering the password. And apparently between the two of us; we're kind of using the same account, we managed to lock ourselves out. So we need to take about a 10-minute break and see if we can get back in so we can pull that up and proceed. So I'm sorry, but let's take a 10-minute break right now. Thanks.

(Whereupon, the above-entitled matter went off the record at 12:30 p.m. and resumed at 12:37 p.m.)

CHAIRMAN BOLLWERK: We've come back off our break and we've gotten the computers working again. We appreciate your indulgence in putting up with this. You all know the only safe computer is one you can't use, and these were very safe right then.

(Laughter)

CHAIRMAN BOLLWERK: So you'd asked us to bring up an exhibit, I think. And I think we've done that now, so we're good. You'd asked us to bring up the exhibit. You were going to --

MR. KNODE: Yes, that's the correct exhibit. Can we expand it, please? Can we scroll down towards the bottom? There. Thank you.

Can I continue, Judge White, with the discussion?

JUDGE WHITE: Please do. Please.

MR. KNODE: If you would look -- this exhibit was not intended for this discussion, but I think we can make it work. If you look at the bottom of this, the kind of tan crosshatched is the entire ore zone and the red crosshatch is the zone that we will mine in. It could be an injection well, it could be a production well. It wouldn't make any different.

What we do when we install a well is we -- what we do is -- the term is called underreaming. You can see how there's an enlarged area within that red zone where we've taken a tool and we've cut away the sandstone face to get a nice clean area to inject or produce from.

So if I understood what you were asking, could we not put a screen in through that entire ten crosshatched area, effectively the entire OZ area, collect water data, water quality data and establish Commission-approved background and then go back and do the mining, re-screen it?

JUDGE WHITE: That's correct.

MR. KNODE: Okay. if you think of now this area, the enlarged area where the blue lines are

coming in, if you think of that now as covering that entire OZ interval, yes, we could collect water from that. Correct. To go back in and only re-screen that red area, which is where we want to mine in, we've created pathways above and below that where our mining solutions now cannot be contained or confined to the area that we want to mine.

Those water -- if we're injecting say -- I think that's an easier picture in your mind. If we're injecting that water we're injecting out that screen, it can go anywhere now in that brown interval because we've created a complete underream open face. Whether we go back and screen at the screen interval or not doesn't make any difference because we've created an annulus or an open void that would allow all of our injection solutions to go up and down that complete interval.

So what's the alternative for that? Because I think what I'm trying to tell you here from an engineering and a well installation -- what you're asking is not practical from a mining point of view. In my opinion what that then would require you to do is have a whole separate set of monitor wells every two acres. So you have your -- now that becomes your compliance point. Okay?

So now you've established Commission-approved background over the entire interval, as you have correctly asked if we could do. And so now we're going to monitor in this discrete interval, but the compliance point is this fully penetrating well. So when we go back to restore, we've now mined in 10 feet, but we're going to pull our fluids from 100 feet and that's going to severely dilute the water quality at your compliance point. So I think it defeats the purpose when you kind of think it all the way through to its logical end.

JUDGE WHITE: Okay. Thank you.

CHAIRMAN BOLLWERK: All right. Anything further on that?

(No audible response)

CHAIRMAN BOLLWERK: All right. Did you have anything, Judge Cole, on that response?

JUDGE COLE: No.

CHAIRMAN BOLLWERK: All right.

All right. Then the next question we have is please further explain the focus on monitoring the mineralized interval within the ore zone to establish CAB for restoration goals.

MR. KNODE: Well, I think we have addressed that, but the --

CHAIRMAN BOLLWERK: If you feel you have, you don't have to give us a further response.

MR. KNODE: No, I'll be glad to clarify if I didn't get it right the first time. But we established CAB, Commission-approved background, in the ore zone because that's the zone that we are going to effect during mining. And that is the area that -- you know, we are required to restore the areas that we affect during mining. So it would be that same discrete interval that we're mining that we are going to be restoring. So that's the rationale for establishing the CAB in that screened monitor interval. I believe that was the question.

CHAIRMAN BOLLWERK: Right. Yes. All right. Thank you.

All right. The next question would be is the UCL established for each well in the monitoring well ring and for the wells that are put in for the overlying and underlying aquifers within the wellfield? And there's sort of a sub-part to that: Or are they established for the monitoring well ring and for each of the underlying and overlying aquifers in its entirety?

MR. SCHIFFER: I can answer that, Judge. This is Ben Schiffer. And the UCLs for the perimeter

monitor well ring are conducted on an individual well basis. Similarly for the overlying and underlying intervals the UCLs are established on an individual well basis.

CHAIRMAN BOLLWERK: All right. The next question then, in response to Judge White's question whether construction of monitoring wells itself may increase the presence of compounds later used to detect excursions -- oh, I'm sorry. We'll go back to the -- you had something you want to say, Judge Cole? I'm sorry.

JUDGE COLE: Yes, pertaining to the UCL. You say you determined that at the monitoring well, and my question is exactly how do you do that? I assume that you take a look at your chemical analyses that could result in the sampling and what the components are and you're going to pick out the ones that are going to travel first, travel fastest to get to that point or the ones that you commonly know are present in the water, not in concentrations that might create problems for you, but in concentrations that would serve as a monitoring chemical.

MR. SCHIFFER: Judge Cole, this is Ben Schiffer, and you're exactly right. So the water quality is measured in the perimeter monitor wells as

well as the overlying and underlying. And the upper control limits are established, in our case, for the perimeter monitor well ring three parameters that are conservative in these hydrologic systems. That is those parameters that we know will not be affected by reduction-oxidation in the system. They include: chloride, which is a very conservative ion; alkalinity which is similarly conservative; and then we also us electrical conductivity, which is a very good indicator of overall water quality.

And so on a well-by-well basis the water quality results are analyzed, the UCLs are established. And the only unique aspect at the Ross project is that the underlying interval happens to have naturally elevated concentrations of chloride. So in lieu of chloride we have proposed and NRC staff have approved the use of sulfate as an excursion parameter, and therefore upper control limits would be established for sulfate in lieu of chloride in that particular water bearing interval.

JUDGE COLE: Thank you.

CHAIRMAN BOLLWERK: All right. Anything further, Judge White, that you have on that one?

JUDGE WHITE: No.

CHAIRMAN BOLLWERK: We're good? All

right. Again, this is the next question which I'd started on, but I'll now go back to the beginning and read from the beginning.

In response to Judge White's question whether construction of monitoring wells itself may increase the presence of compounds later used to detect excursions Mr. Demuth testified he has not seen such increases. Can he explain how he would know that such increases have occurred? Does he have data from a well installed in an ore zone using non-oxygenated fluids and nitrogen instead of air lifting? In other words, does he have any data from a well installed without using any oxygen in the drilling fluids or development stage?

MR. DEMUTH: Your Honor, I have never seen a well that's been installed with nitrogen. I have never heard of a well being proposed to be installed with nitrogen or even discussed in any fashion for an ISR operation in the United States or anywhere within the world.

CHAIRMAN BOLLWERK: All right.

MR. DEMUTH: With regard to the data pre and post, we have several things: There are several ways to evaluate water quality, and certainly in my experience we've done plenty of sampling for

environmental sites where we've looked at pre and post water quality. We can also run resistivity logs to evaluate filtrate invasion potential impacts on water quality. Typically that's not done at ISR. But what we do have is a system or a process with multiple wells in an very small area that are sampled over and over and over. And over the lifetime of these wells thousands of water quality samples are collected.

So I would submit that the duration and the number of samples are indicative of the water quality and the usefulness of those wells and that we don't see water quality changes in those wells over time whether it's immediate post-drilling or a month or a year or 10 years post.

CHAIRMAN BOLLWERK: All right. Judge White, anything that you have in response to --

JUDGE WHITE: No.

CHAIRMAN BOLLWERK: No? Anything, Judge Cole?

JUDGE COLE: No.

CHAIRMAN BOLLWERK: All right. The next question for the witnesses: Will STRATA be required to perform excursion monitoring during aquifer restoration?

MR. SCHIFFER: This is Ben Schiffer.

Judge Bollwerk, I'll take that. And I think quickly if you take a look at the SER, the staff analyzed this both in the license application and as I reference in the SER actually at 87. We will be monitoring for excursions through restoration and as well as into stability monitoring. So, yes.

CHAIRMAN BOLLWERK: All right. Anything further, Judge White?

JUDGE WHITE: Nothing, thank you.

CHAIRMAN BOLLWERK: All right. Let me then go to the last question. Please compare the 400-foot maximum distance to perimeter monitoring wells with your experience at other ISR facilities.

MR. LAWRENCE: This is Errol Lawrence with Petrotech. I've worked on about a dozen ISR sites and typically the value of around 500 feet is most commonly used, so 400-foot spacing for the monitor well distance is actually conservative. It's a shorter distance than most sites would typically have.

JUDGE WHITE: All right. And one of the license conditions is that the monitor wells cannot be outside the exempt aquifer. Is that correct? How far does the exempt aquifer extend from a well field? And this is more a matter of curiosity.

MR. SCHIFFER: In this case the exempted

aquifer extends 100 feet beyond the perimeter monitor well ring, and that is a site-specific calculation based on groundwater velocity in this ore zone aquifer.

JUDGE WHITE: I see. Thank you.

CHAIRMAN BOLLWERK: All right. Judge Cole, do you have anything?

JUDGE COLE: No.

CHAIRMAN BOLLWERK: All right. Those are the questions we have then. I'll raise this although I'm hoping -- does anybody have any other questions?

MR. PUGSLEY: None from SEI, Your Honor.

CHAIRMAN BOLLWERK: All right.

MR. HARPER: None from the staff, Your Honor.

CHAIRMAN BOLLWERK: No?

MS. ANDERSON: No, Your Honor.

CHAIRMAN BOLLWERK: All right. Good answers.

(Laughter)

CHAIRMAN BOLLWERK: In theory this could -- I don't even want to think about how long this could go on, but we won't have to worry about that this time, in any event.

So it's now 10 until 1:00. I think given

the -- we took us a little longer with the technology to get where we needed to be in terms of these questions, so why don't we go ahead and take our lunch break now and when we come back we'll swear in the staff panel and do the exhibits for Contention 1. And let's say -- well, we'll just round it off. This is our first say. Let's say 2:00 for everybody to come back. Hopefully that will give everyone enough time. So we'll recess until 2:00 p.m. Thank you.

(Whereupon, the above-entitled matter went off the record at 12:51 p.m. to resume at 2:00 p.m. this same day.)

CHAIRMAN BOLLWERK: All right, can we go on the record, please? All right, it's approximately 2 o'clock and we're back from our lunch break for the afternoon. We had just finished with the Strata witnesses for Contention 1 and now we're ready to move to the NRC staff's witnesses for Contention 1.

Anything the parties need to raise for the Board before we do that? I think we're in good shape. All right, then let's go ahead and if you would go ahead and empanel your witnesses or have them be seated.

While they're coming up, I'm going to ask a question. The original testimony had four people on

it. Mr. Burgess?

MR. HARPER: So Mr. Burgess is a witness for Contention 3, not for Contentions 1 and 2.

CHAIRMAN BOLLWERK: Okay, got it. All right.

MR. HARPER: So we defer to you, Judge Bollwerk, on whether you would like to swear him in right now or wait until he comes up for Contention 3.

CHAIRMAN BOLLWERK: Let's wait.

MR. HARPER: His testimony is combined with the other three witnesses.

CHAIRMAN BOLLWERK: Right. Under the circumstances, if you don't mind, let's have him go ahead and come up and let's swear him in. I do want to ask him a question about his testimony and then he can obviously go back to his seat because he obviously has nothing to say about this one. It would better to get him all sworn in and have his testimony because the exhibits that are shared are one thing. The witness statements are something else.

All right, good afternoon, everyone. If you would, I would appreciate if all of you could raise your right hand and please provide me with an oral response to the following question. I'll start at this end of the table. Do you swear or affirm that

the testimony you give in this proceeding will be the truth, the whole truth and nothing but the truth?

MR. SAXTON: Yes, Your Honor.

DR. JOHNSON: Yes, Your Honor.

MS. MOORE: Yes.

DR. BURGESS: Yes, Your Honor.

CHAIRMAN BOLLWERK: All right, and I guess for the court reporter's benefit, we should have you identify yourselves first. Let's do that, I'm sorry.

MR. SAXTON: John Saxton.

DR. JOHNSON: Kathryn Johnson.

MS. MOORE: Johari Moore.

DR. BURGESS: Tony Burgess.

CHAIRMAN BOLLWERK: All right. Are we in good shape then, sir? All right.

Then let's go ahead and deal with your testimony which is -- I want to get your testimony in and then we'll -- you can go back to your seat until Contention 3 comes up.

So we're dealing with two pieces of testimony, NRC001 which is the direct prefiled testimony, and NRC044-R2 which is the rebuttal testimony which has been revised a couple of times. So with respect to that testimony which each of you are a party to, I'm going to ask you a second

question. Was this testimony prepared by you or under your supervision and direction and is it true and correct to the best of your knowledge and belief? And again, if you could give a response as we come down the line.

MR. SAXTON: Yes, Your Honor.

DR. JOHNSON: Yes, Your Honor.

MS. MOORE: Yes, Your Honor. It's true.

DR. BURGESS: Yes, Your Honor.

CHAIRMAN BOLLWERK: Then let's go ahead and we'll identify those two pieces of testimony and have them admitted into evidence.

And Mr. Burgess, we'll be done with you for the time being.

So we're looking for identification purposes NRC001 which is the testimony of Johari Moore, John Saxton, Kathryn Johnson, and Anthony Burgess. And also for the purpose of the record identification NRC Exhibit 044-R2 which is the rebuttal testimony of Johari Moore, John Saxton, Kathryn Johnson, and Anthony Burgess.

(Whereupon, the above-referred to documents were marked as Exhibit NRC001 and NRC044-R2 for identification.)

That testimony has been identified for the

record. Again, any objections from anyone, recognizing our protocol? I don't hear any, so we will admit into evidence Exhibits NRC001 and NRC044-R2 as they have been identified for the record.

(Whereupon, the above-referred to documents were received into evidence as Exhibits NRC001 and NRC044-R2.)

I thank you, Mr. Burgess. You can go back to your seat now. Thank you, sir.

All right, let's then deal with really briefly the other NRC exhibits that go with Contention 1 or in some instances other contentions, but we'll go ahead and admit them all now.

The first one, NRC002, and again, these are for purposes of identifying for the record, the Statement of Professional Qualifications of Johari Moore.

NRC003, the Statement of Professional Qualifications of John Saxton.

NRC004, Statement of Professional Qualifications of Kathryn Johnson.

NRC005, the Statement of Professional Qualifications of Anthony Burgess.

NRC006A and NRC006B which constitute the NUREG-1910, Supplement 5 to the Draft Report for

Comment, of the Environmental Impact Statement for the Ross ISR Project in Crook County, Wyoming; Supplement to the Generic Environmental Impact Statement for In situ Leach Uranium Milling -- I think it's supposed to be Mining Facilities; the Final Report.

And then NRC007, Generic Environmental Impact Statement for In situ Leach Uranium Milling Facilities.

NRC008, the Generic Environmental Impact Statement for In situ Leach Uranium -- is it Milling or Mining? I think it's mining.

MR. PUGSLEY: It's Milling, Your Honor.

CHAIRMAN BOLLWERK: It's Milling, I'm sorry. Milling Facilities. You had it right and I had it wrong. I'm changing what you had correctly. Chapters 5 through 12 and Appendices A through G, May of 2009.

NRC009, the NRC Record of Decision for the Ross Uranium In situ Recovery Project, April 24, 2014.

NRC010, the Errata No. 1 to the Ross FSEIS which is April 23, 2014.

NRC011, which is Errata No. 2 to Ross FSEIS, August 14, 2014.

NRC012, the Affidavit of John Saxton Concerning Joint Intervenors' Motion for Summary

Disposition of Contention 1 which is July 3 2013.

NRC013, NUREG-1748, Final Report, Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, August 2003.

NRC014, Wyoming State Engineer's Office, June 2011, Regulations and Instructions Part III: Water Well Minimum Construction Standards.

NRC015, Groundwater and Wells, Johnson Screens by Driscoll, F.G., from 1986.

NRC016 are -- and we did receive the document that went into the EIE this morning so we'll go ahead and admit that version.

Again, NRC016R, ND Resources, 1977. Has the title changed at all?

MR. HARPER: No, the title is the exact same.

CHAIRMAN BOLLWERK: Okay, Nubeth Joint Venture Environmental Report, Supportive Information to Application for Source Material License, Sundance Project. I should check, I take it all the parties got a copy of the revised exhibit?

MR. PUGSLEY: Yes, sir.

CHAIRMAN BOLLWERK: All right. NRC017, Nuclear Dynamics, Quarterly Report, Summary of Water Quality Program. Source Material License No. SUA-

1331, Docket No. 40-8663. 1978.

NRC018, Nuclear Dynamics, 1980, Restoration Report, Sundance Project.

NRC019, ND Resources, 1982, Assessment of Restoration Activities, Sundance Project.

NRC020, Staub et al., NUREG/CR-3967, An Analysis of Excursions at Selected In situ Uranium Mines in Wyoming and Texas, 19868.

Then we skip to NRC043 which is the ISR Wellfield Ground Water Quality Data, Irigaray Mine Unit 1. NRC Report 2014.

NRC044-R2. We've already done that one. That's come in.

NRC045 which is the Wyoming Department of Environmental Quality, 2012 Letter re Ross ISR Project Groundwater Reclassification.

NRC046 the Stumm and Morgan, Steady State v. Equilibrium Report, pages 79-8 and that's 1996.

And one more, the NRC047, Stone and Truax, 2041, "In situ Recovery Uranium Mining Restoration Challenges." So we've marked all those for identification.

MR. HARPER: Your Honor, this is Richard Harper with the NRC staff. There was one correction.

We filed an updated exhibit list, I believe yesterday evening with the updated or revised staff testimony, the corrected one of the citation. That was NRC046, page range was 79 through 81.

CHAIRMAN BOLLWERK: Okay. So 79 through 81, okay. That document is identified as corrected by counsel. All right.

(Whereupon, the above-referred to documents were marked as NRC002, NRC003, NRC004, NRC005, NRC006A, NRC006B, NRC007, NRC008, NRC009, NRC010, NRC011, NRC012, NRC013, NRC014, NRC015, NRC016-R, NRC017, NRC018, NRC019, NRC020, NRC043, NRC045, NRC046, NRC047 for identification.)

So again any objections to the admission? If not, then we will consider exhibits NRC002, NRC003, NRC004, NRC005, NRC006A, NRC006B, NRC007, NRC008, NRC009, NRC010, NRC011, NRC012, NRC013, NRC014, NRC015, NRC016-R, NRC017, NRC018, NRC019, NRC020, NRC043, NRC045, NRC046, NRC047 admitted into evidence.

(Whereupon, the above-referred to documents were received into evidence as NRC002, NRC003, NRC004, NRC005, NRC006A, NRC006B, NRC007, NRC008, NRC009, NRC010, NRC011, NRC012, NRC013, NRC014, NRC015,

NRC016-R, NRC017, NRC018, NRC019, NRC020, NRC043, NRC045, NRC046, NRC047.)

Did I miss anything?

MR. HARPER: No, sir.

CHAIRMAN BOLLWERK: All right. And I should mention that just for the record that the exhibit -- hold on one second here. NRC016, there's actually a dash, -R is the actual exhibit number.

All right, so those are all in evidence. The panel is here. I think Judge White may have some questions.

JUDGE WHITE: I do, thank you. The first question goes to the first question I asked Strata's witnesses and that is whether you have anything that you'd like to add to what has already been stated regarding the sort of the definition or meanings of the terms background water quality, baseline data, excursion monitoring upper control limits or UCLs, and Commission-approved background or CAB. Do you feel those have been adequately explained so far? Is there anything you'd like to add to clarify those terms?

MR. SAXTON: Your Honor, I just want to make one comment on the background and baseline. The regulations in Part 40 actually use those interchangeably. When we consider background is just

a sample that was acquired before operations begin. It could be baseline if you're using that in the future as a measure of any impacts. So that's how we interpret it.

JUDGE WHITE: A number against which to compare another number?

MR. SAXTON: Yes.

DR. JOHNSON: If I may, Judge White, for the purposes of the environmental impact statement, we noticed early on that the two terms which are often used interchangeably but may not be, would cause some degree of confusion or just a mixup. And so that's why we made the decision that we wanted to be very clear in what data set we were referring to. So we adopted the terminology which we defined at some point in the SEIS what those terms meant. And that's why we went then to the pre-license site characterization and post-license pre-operational terminology to try to differentiate and distinguish what we were talking about.

CHAIRMAN BOLLWERK: Can I just ask one? Is that terminology now going to be adopted in all FSEISs going forward or is this only for Strata?

MS. MOORE: Your Honor, not necessarily. It was unique to the situation where we thought it was

warranted to clarify those terms and there's no reason why necessarily future SEISs would need to do that. I'm hoping through this hearing we'll be able to establish what's meant by that so it's not confusing in the future.

CHAIRMAN BOLLWERK: All right, well, maybe the confusion will continue and maybe it won't. We'll have to see. All right, go ahead.

JUDGE WHITE: Getting to this issue of how the samples are collected to establish CAB, Commission-approved background, and we heard testimony confirming that the samples in the monitoring wells or the sampling wells that are going to be established within the wellfield, are going to take samples from a very narrow interval, something on the order, correct me if I'm wrong, but seven, eight feet perhaps within an ore zone. And that wells will be screened to take water from this. Is this consistent with how you view the sampling program in License Requirement 11.3(a) in the license?

MR. SAXTON: Yes, it is, Your Honor. Typically, the zones are on the order of 16 feet, instead of 7 or 8, it's more. And that's based on a lot of financial assurance, the calculations they have to determine what the average core thickness screened

intervals. The reason why we use that as the Commission-approved background is because those are the wells that are going -- we want the same wells before operations to be the same wells that are measured restoration success. So therefore, those are screened in just that interval. On the surrounding perimeter well ring, they would also be screened on the same intervals.

So when they initially do the well testing, they have to a pump test and they have to show that those wells are interconnected, they are indeed on the same intervals for our -- to be able to say that we can monitor for early time detection of a new release through the excursion monitoring program.

What happens is the background is established and then after mining we use that background that we snapshot that narrow screen right in to measure the success of the restoration. So that's how -- at the same wells. So that's how we use those.

JUDGE WHITE: During mining, throughout the life of a wellfield, will the screened interval be changed as the mining company is essentially mining different horizons within the ore zone?

MR. SAXTON: They, in their license

application they would tell us that there's going to be stacked ores, bodies within that ore zone and that they intend to do that, in other words have stacked ore zones.

If they do have stacked ore zones, then each of those intervals will have to be monitored on the surrounding perimeter ring. Generally, the production area that's closest to that weld would be that horizon that that weld was screened at so that we have early time detection of that horizon.

But they won't go -- it would be difficult to go and change the -- start operating on a lower zone and then use the same wells to go in the upper zone. You have to put in separate wells to do that. But they have to establish the baseline before any operations are done if they want to do multiple horizons.

JUDGE WHITE: Okay, that's very clear. I just wanted to reiterate that in fact for the company to mine a horizon that has maybe 30 or 40 feet above a horizon that they've started out mining, they would have to drill a brand new well and screen it for that new horizon? Is that what you're telling me?

MR. SAXTON: That's generally what happens. Sometimes they do have multiple licenses for

each well, but that's only when they overlap. Sometimes the stacked horizons don't overlap each other.

JUDGE WHITE: All right.

MR. SAXTON: Before they even start mining though they have to get baseline on all of the horizons.

JUDGE WHITE: Right, out in the monitoring well, but where I'm talking about the baseline that's established for CAB within the wellfield.

MR. SAXTON: Within the wellfield, too.

JUDGE WHITE: Yes. I'm sorry to be dense on this. So the Commission-approved background will be established from a narrow horizon within a specific vertical ore bed if there are stacked ore beds and that will then -- that screen level will stay there and then that well will also be the well that's used to monitor water after mining ceases for restoration purposes.

MR. SAXTON: That's correct.

JUDGE WHITE: To compare. So the screen interval in the well won't be changed ever during --

MR. SAXTON: No, it won't.

JUDGE WHITE: Okay. That's good. I guess you've already answered this question and that is that

establishing CAB in a horizon this narrow and using that narrow horizon to sample water for restoration comparison is common practice at ISL operations, is that correct?

MR. SAXTON: That is correct.

JUDGE WHITE: So we've heard that the reason this is done is for engineering and mining purposes. I don't know how to phrase this other than to say that in a perfect world where finances didn't play a role, in your opinion would there be a reason and would it be better procedure to take a wider sample through an aquifer, in this case through the OZ aquifer for both establishing CAB and for assessing the success of restoration. Or is there a scientific reason why that would not necessarily be any better at all?

MR. SAXTON: My opinion is it's better to have to have it in a narrow zone because we're just measuring what the impact is during operations on that zone itself. Typically, a lot of the aquifers that are under ISRs are fluvial in nature and the vertical anisotropy is such that it's on the order of 10 to 100. The horizontals is 10 to the 100 times that in the vertical direction. And you can calculate what the flare factor would be going to vertical. And it's

really minimal at that range. So when we measure the restoration, we want to instead of going throughout the whole interval, we can see exactly what the impact is to the ore zone quite easily and measure that as how far efficient they've restored things.

If it goes to the baseline that was originally or to MCL, then it would be fine. If they do have to use the third standard, an ACL, what we will do is look at the wells at a perimeter ring as the point of exposure and that would be more of the quality outside of the ore zone. So that baseline would be what we would use if we're looking at that as like a point of exposure. So it has to be protected there.

JUDGE WHITE: I see. That's helpful. Thank you. That's all I have about the screening issue.

Judge Cole, do you have anything to add regarding this issue of screen intervals?

JUDGE COLE: Just a question for clarification. How often do you have these multiple horizon situations?

MR. SAXTON: It's very site specific. What normally happens if they have a well that's screened in multiple horizons, they'll use that as a

pumping well and we would require them to abandon that well because it's screened over multiple horizons and we start operation at one horizon, it will provide a conduit for fluid migration to maybe in another part of the ore zone that's not going to be mined. And so we would require them to do it.

But as far as the number of wells, I have to go back and look at all the different ones. I know there's a lot in the State of Wyoming because of the fluvial nature of it that they do have them, but it's site specific actually. Generally, it's usually just one well that's framed in one stacked horizon. I don't remember very many that are screened over multiple horizons.

JUDGE COLE: What do you do in that case? Do you have a multiple horizon plan? Do you just go between the two uranium-ladened layers and consider that one well?

MR. SAXTON: Yes. They usually screen if it's two adjacent abutting ones, they'll screen over both of them and then they'll get the quality for that for both of them.

JUDGE COLE: With respect to recovery, just consider that one area to be recovered?

MR. SAXTON: That's correct, Your Honor.

JUDGE COLE: Thank you.

JUDGE WHITE: Next issue?

CHAIRMAN BOLLWERK: I think we're good.

JUDGE WHITE: I would like to just touch again on the issue intervenors have raised many times about the effect of drilling on the oxidation state within the ore zone which in turn can affect the amount of uranium that is in solution versus tied up in the ore minerals.

Do you see any possibility of any significant increase in oxidation at the site of drilling or at the bottom of the hole as a result of developing a wellfield?

DR. JOHNSON: Judge White, when we -- when the data were analyzed that we used in the SEIS, we were mindful of the theoretical possibility and also paid attention to the fact that at the very -- when the wells were initially done, like that very day or within a couple of days, there did appear to be some elevated levels. And Strata did not include that data in their quarters for monitoring. So that was not included.

The other data appeared to me to be very valid and to show no impact from oxidation for a variety of reasons. One, because if you look at the

constituents beyond just uranium, for example, ammonia was present in most of the water quality. Ammonia only exists under non-oxidizing conditions. And ammonia was present. There were some that were less than detectable, but many of them had the presence of ammonia.

As well as we looked at the range of uranium, the max. and the min., the maximum and minimum over the sampling period, the four quarters and then two years, eight quarters. And that range was essentially the same over that period of time. So then there were a couple of wells, in fact, the well that had the highest concentration of uranium rather than showing a decline over that two-year period that you would expect, if it started out being biased by oxidation and it would be slowly reduced over time, it actually increased slightly which is in opposite to some of the wells had a very, very slight decrease. So there really wasn't to me a compelling, any compelling evidence that there was any systematic bias in those data due to perturbations that could have been caused by the well installation or sampling.

JUDGE WHITE: Judge Cole, do you have anything to add to this issue?

JUDGE COLE: Yes. You say there's a lot

of ammonia there, but it would be that the ammonia would be dissipating and then oxidation could not take place, or the ammonia was being would be oxidizing and released from the well?

DR. JOHNSON: Judge Cole, yes, nitrogen in any of those cases is in a reduced state and if they were oxidized it would be nitrate or nitrite which wasn't present. So there might be some ammonia that was being dissipated or released or any of those scenarios, but it didn't appear that it was oxidized to the nitrite or the nitrate.

JUDGE COLE: Thank you.

JUDGE WHITE: Are you aware of any studies that have been done using alternative drilling methods such as those suggested by intervenors' expert witnesses that have then been compared with drilling done by standard industry methods that show any difference in those two?

DR. JOHNSON: Judge White, I am not aware of any studies that were done for that particular purpose that you're describing. However, I am aware of some real recent work done. In fact, it's one of our exhibits and the exhibit is an actual presentation of some of the initial results where --

JUDGE WHITE: Excuse me, I'm sorry. Which

exhibit is that?

DR. JOHNSON: The exhibit --

MR. SAXTON: 47?

DR. JOHNSON: Yes, NRC047.

JUDGE WHITE: Thank you.

DR. JOHNSON: And in this study, the researchers were making every attempt to preclude oxygen and they went to some great lengths in the sampling to try to prevent oxygen. And indeed, the uranium concentration that was measured in the ore zone that was sampled under those conditions shows, I believe it's -- I think it's 22, the PDF page 22.

So the value that was reported in that particular study was 0.11 milligram per liter of uranium which is within the range of what the data that we had for the Ross project.

JUDGE WHITE: That's all the questions I have about the oxidation related to drilling.

Judge Cole, do you have anything to add?

JUDGE COLE: No.

JUDGE WHITE: I'm good.

CHAIRMAN BOLLWERK: You're finished? Judge Cole, do you have any other questions for the panel?

JUDGE COLE: Well, there's one question

here I don't think has been answered yet. To the extent witnesses' rebuttal testimony at NRC044-R, page 17, it states three criteria for successful restoration any one of which is positioned to meet the regulatory requirement. Three are listed. First is the restored and condition approved background. Two is restore to a value given in the table in paragraph 5(c) of Appendix A if the constituent is listed in the same way as the background level of the constituents below the value listed. Or three, restore to an alternative concentration limit established by the Commission which is subject to a finding that a concentration is reasonably achievable and will not pose a substantial presence for potential hazard to health and the environment.

Are these criteria listed in order of priority?

MR. SAXTON: In the past, they've been talked about as being primary and secondary standards. In the regulations, they are either actually either or. The first two, the Commission-approved background or Table 5C was actually MCL at the time, so if you say MCLs or Commission-approved background, they are interpreted as posing no incremental health hazard or pose a harmful situation. So if you achieve those,

then there's no need to do any hazard assessment or anything else.

On the other hand, if you can achieve those and you need an ACL, there's things that you have to do for us to approve that, one of which is to make sure that it's ALARA and then you have to do hazard assessments to ensure that the levels that you propose, or your licensee proposes for the Commission to approve, are protected and safe.

JUDGE COLE: Do you have to file for a license amendment then?

MR. SAXTON: That is correct.

JUDGE COLE: All right, thank you.

CHAIRMAN BOLLWERK: Anything further you have on that?

JUDGE WHITE: No.

CHAIRMAN BOLLWERK: All right, I think again my questions I am going to defer until I think we're going to do a separate panel at the end.

All right, at this point, I'll give you all 15 minutes again, is that appropriate if you have any additional cross examination questions you would like the Board to ask this panel of witnesses? Why don't we go ahead and take a break. It's about 25 'til, so why don't we say -- it would be about 10 'til

3, right, exactly.

(Whereupon, the above-entitled matter went off the record at 2:36 p.m. and resumed at 2:51 p.m.)

CHAIRMAN BOLLWERK: Can we go back on the record? We do have one question and we are going to go ahead and briefly conference with Judge Cole. I don't think it should take all that long and then we'll be back and proceed from there.

I should mention one thing. I should have mentioned it before, to the degree you have questions, if you want to put the name of the party on top on them, we've been doing that so when we put them on the record it will be clear who was asking them. But I prefer to have your handwriting on there rather than mine. It might make it look like I'm changing your questions, although I could do that, I suppose. But anyway. In fact, we might. Who knows? In any event, if you could just mark your questions that way it will be clear for the record exactly who proposed them.

All right, why don't we go ahead and take a brief recess. I don't think this will take particularly long. We'll be back in a couple of minutes and then the plan from there would be -- actually, I'll give you something to think about, given where we're at. It looks like I do believe

we're going to finish Contention -- at a minimum, we'll finish Contention 1 today. What would be your preference, if any, in terms of starting tomorrow morning? Because I think we're willing to start fairly early if you all are interested in doing that. We don't have to talk about it right now. Just think about it among yourselves and we'll come back to that after we get done with Contention 1.

MR. PUGSLEY: Your Honor, if I may, just really quickly.

CHAIRMAN BOLLWERK: Sure.

MR. PUGSLEY: We had sent the communication to all counsel and the Board regarding a potential revisiting of the site tour of Nichols Ranch. And I just wanted to let you know that for timing purposes we probably would need to let Your Honors' personnel know some time tomorrow morning whether or not the Board would like to do that.

CHAIRMAN BOLLWERK: Got it. All right. Again, as I had mentioned I think before, and I know I mentioned in the presence of counsel during the site visit, this is obviously the first priority. And so we have to get the hearing done at a minimum. I don't want to drive folks for the site visit to do things that aren't in their best interests in terms of the

hearing. So we can talk when we get back about tomorrow and when we want to start. Very good.

Okay, we're going to take a recess and we'll be right back.

(Whereupon, the above-entitled matter went off the record at 2:53 p.m. and resumed at 3:05 p.m.)

CHAIRMAN BOLLWERK: All right, we've just come back from a brief break for the Board to consider the question, the potential cross-examination question, provided by one of the parties. I think we were going to ask the question, we're going to change it just slightly to address a concern we had. The question is does the Strata license require that the perimeter monitor wells be fully screened in the ore zone aquifer as recommended in NUREG 1569?

MR. SAXTON: I'd have to review the license.

MS. MONTEITH: Your Honor, would it be possible to pull up the license as an exhibit?

CHAIRMAN BOLLWERK: It is, although it's fairly lengthy.

MR. PUGSLEY: SEI010 which is the Safety Evaluation Report, 287, page 287.

CHAIRMAN BOLLWERK: Thank you.

MR. SAXTON: For the perimeter monitoring

well ring we would require fully penetrating wells.

CHAIRMAN BOLLWERK: I'm sorry?

MR. SAXTON: For the perimeter monitoring well ring, the overlying and underlying is fully penetrating wells.

JUDGE COLE: Forty three.

JUDGE WHITE: Does that mean screened?

MR. SAXTON: Screened throughout the entire --

JUDGE WHITE: Of the aquifer.

MR. SAXTON: Yes.

JUDGE WHITE: Am I mistaken that I thought I heard testimony earlier saying that the water that was sampled in the monitoring wells would be -- during monitoring, would be sampled only in the narrow horizon into which the lixiviant is being introduced?

MR. SAXTON: Yes, that's -- there's a distinction between whether or not a well should be fully penetrating or not. There's a difference of opinion whether the dilution effects of the fully penetrating well diminishes your ability to detect monitoring program whereas a partially screened well may not detect an excursion that might occur in an ore zone above it or below.

Some licenses, we actually require a well

that's screened in a specific horizon within the ore zone. And that's what I was referring to when I was referring to the partially penetrating well.

JUDGE WHITE: But in this license?

MR. SAXTON: In this license, it's going to be a fully screened well.

JUDGE WHITE: Okay, so the former comment about it being narrow screened for this particular -- for the Ross --

MR. SAXTON: For Ross.

JUDGE WHITE: Was not, correct?

MR. SAXTON: No, it wasn't.

JUDGE WHITE: I see. Judge Cole, do you have something to add?

JUDGE COLE: No, but I could ask what do you mean by full penetration? That's fully screened?

MR. SAXTON: That would be fully screened -- generally, there's multiple sand horizons and it would be screened throughout that sand horizon. That's what I meant.

JUDGE COLE: What do you mean horizon?

MR. SAXTON: In the ore zone, the ore body how they defined it is there's the stacked sand bodies from different channel deposits. In some cases, one of those sand bodies will be hosting the ore zone.

And if they're mining in that specific channel deposit, the permanent well ring would be in this case fully penetrating that whole sand body instead of just the ore zone, instead of being open to multiple horizons in that ore zone for other screened, other sand units that are not being mined.

JUDGE COLE: You're talking about a production well?

MR. SAXTON: No, just the perimeter ring wells.

JUDGE COLE: That's different from the well you were just describing.

JUDGE WHITE: The UCL, as established from the perimeter monitor wells, will be established from water that's essentially an average of all of the water the OZ aquifer?

MR. SAXTON: Yes.

JUDGE COLE: Okay, thank you.

CHAIRMAN BOLLWERK: Anything further? All right. Then at this point we will go ahead and dismiss this panel. And if there is -- I think we may be seeing you again a little later this afternoon, so stick around. But for right now, you're finished.

I think we're ready for the joint intervenors' witness on Contention 1. While that's

happening, while he's coming up, maybe you want to talk a second about tomorrow morning, whatever thoughts you all have?

MR. PUGSLEY: Your Honor, we've all conferred and we certainly wouldn't mind starting at 8:30.

CHAIRMAN BOLLWERK: 8:30, okay. We were going to for 8, but if you want 8:30, that's fine. We will plan on 8:30 then. And then you said, they need to know by mid-morning, we're talking --

MR. PUGSLEY: I would say early afternoon would probably be --

CHAIRMAN BOLLWERK: I think we'll have a good sense, if we're pretty well done with Contention 2 tomorrow morning, we're probably in pretty good shape. If Contention 2 is going over into the afternoon, then we're probably not in pretty good shape to finish tomorrow. So we should have a good sense of what's going on by the middle of the afternoon tomorrow.

MR. PUGSLEY: Thank you, Your Honor.

CHAIRMAN BOLLWERK: Sure. All right.

MR. CRYSTAL: Your Honor, one point of clarification.

CHAIRMAN BOLLWERK: Sure.

MR. CRYSTAL: On Contention 1 which we're about to start with regard to the joint intervenors' exhibits, we have marked the testimony of Dr. Larson as being for all contentions. We discussed with other counsel here today and we have no objection to this and we think it's simpler. His testimony is really only on Contentions 2 and 3.

CHAIRMAN BOLLWERK: That's what I thought.

MR. CRYSTAL: So if it requires a revised exhibit list, we're happy to do it.

CHAIRMAN BOLLWERK: No. I've already kind of taken that into account. I sort of figured that was the case.

MR. CRYSTAL: So Exhibits 4, Exhibits 5A-R, B-R, and Exhibit 52-R all relate to Dr. Larson's testimony.

CHAIRMAN BOLLWERK: I'm sorry, can you give me those numbers one more time?

MR. CRYSTAL: JTI004, JTI005 --

CHAIRMAN BOLLWERK: These are all Contention 2 and 3?

MR. CRYSTAL: Yes. And 5 has subparts, JTI052-R.

CHAIRMAN BOLLWERK: That's Contention 2 as well, right?

MR. CRYSTAL: Yes.

CHAIRMAN BOLLWERK: Any others that are --

MR. CRYSTAL: Yes, 003-R. Thank you.

CHAIRMAN BOLLWERK: And that's Contention 2. So Contention 3, joint intervenors' Contention 3, 000-R, Contention 4 and Contention 5A-4 and B-R.

MR. CRYSTAL: Right, and 52.

CHAIRMAN BOLLWERK: And 52. Thank you. Is that the rebuttal testimony?

MR. CRYSTAL: Right.

MR. PUGSLEY: If I may, Your Honor.

CHAIRMAN BOLLWERK: Yes.

MR. PUGSLEY: Just before we get into admitting exhibits, I think we had discussed that JTI-001-R and 002 instead of all contentions were 1 and 3, correct?

MR. CRYSTAL: That's correct as well.

CHAIRMAN BOLLWERK: Great. Let me just mark this a second here.

J U D G E W H I T E :

Dr. Abitz, is that the correct pronunciation?

DR. ABITZ: Abitz like rabbits.

JUDGE WHITE: Oh, Dr. Abitz, excellent.

CHAIRMAN BOLLWERK: Would you mind moving

one chair over and the only reason I ask that is so that we can both see each other a little bit better.

DR. ABITZ: I'm a little further from the monitor. I won't be able to see the monitor. That's why I'm here so I can see the monitor.

CHAIRMAN BOLLWERK: Whatever is best for you is perfectly fine.

DR. ABITZ: It's a matter of being close enough so I can --

CHAIRMAN BOLLWERK: It's not critical and I was just thinking it's always easier to talk with someone --

DR. ABITZ: If I can't see the monitor, I can move up to it?

CHAIRMAN BOLLWERK: Can you see the screen over there? Because whatever goes on the monitor goes on the screen, too.

DR. ABITZ: The big one is a little difficult to see.

CHAIRMAN BOLLWERK: All right, if there's a problem, let us know, we'll just let you move closer.

DR. ABITZ: We'll start here.

CHAIRMAN BOLLWERK: All right. So at this point, Dr. Abitz --

DR. ABITZ: Correct.

CHAIRMAN BOLLWERK: Why don't you go ahead and raise your right hand, if you would, please and I need an affirmative oral response. I need an oral response to the following question. Do you swear or affirm that the testimony you will give in this proceeding will be the truth, the whole truth and nothing but the truth?

DR. ABITZ: I do.

CHAIRMAN BOLLWERK: And then with respect to the pre-filed direct testimony that is marked as -- that is submitted as JTI001-R and also the rebuttal testimony has been submitted as JTI051.

Let me ask you another question. Was this testimony prepared by you or under your supervision and direction and is it true and correct to the best of your knowledge and belief?

DR. ABITZ: It was.

CHAIRMAN BOLLWERK: Thank you. At this point then, let's go ahead and deal with the exhibits for Dr. Abitz that deal with -- we'll do both contentions, some of them are going to be 3, some of them will be 1, but there are no objections to those in terms of any issues, so we'll just go ahead and admit them all now. They're jointly implicated. And

again, the important part is that JTI005A and 5B-R are not implicated right now. We'll deal with that tomorrow when we deal with Contention 2. Is everybody on the same page? Great.

Then briefly, we're now going to mark for identification JTI001-R which is the Testimony of Richard Abitz.

JTI002 which is the Statement of Professional Qualifications of Richard Abitz, dated August 25, 2014.

JTI006 which is an EPA, 2009, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities.

JTI007 has been removed as a duplicate.

JTI008 has been removed as a duplicate.

JTI009 which is an article by Professor Abitz or Dr. Abitz and B. Darling, 2010. Anthropogenic Induced Redox Disequilibrium in Uranium Ore Zones, Geological Society of America Abstracts with Programs, Volume 42.

JTI010, an article by multiple authors from 2008, Hydrogeochemical evaluation and modeling performed within the Swedish site investigation programme from Applied Geochemistry, Volume 23, No. 7.

JTI011, an article by multiple authors,

USGS Water-Resources Investigations Report 96-4233, "Guidelines and Standard Procedures for Studies of Ground-Water Quality: Selection and Installation of Wells and Supporting Documentation," Reston, Virginia, 1997.

JTI012, Brooks, D.G., the author, 1988, Eh-pH Diagrams for Geochemistry, published by Springer-Verlag of New York.

JTI013, an article by multiple authors from 2007, Visual Sample Plan, Version 5.0, User's Guide, PNNL-16939, Pacific Northwest National Laboratory, Richland, Washington.

JTI014, a U.S. Department of Energy Fernald Field Office article, Characterization of Background Water Quality for Streams and Groundwater, May 1994.

JTI015, UEC publication, Goliad Project Production Area Authorization Application for Production Area-1, PA-1, August 27, 2008.

JTI016, also by UEC, basically the same document and update, however, from March 27, 2009.

JTI017, a Texas Water Commission, 1988, Production Area Authorization for the Kingsville Dome Mining Project.

JTI018, Texas Water Commission, 1990,

Production Area Authorization 3 for Kingsville Dome Mining Project.

JTI019, that is Table 2.7-4 from URI 1983c.

JTI020, Texas Commission on Environmental Quality, 2006, Kingsville Dome Mine, Production Area 3.

JTI021, Garcia Data Sheets.

JTI027, United States Geological Survey, Docket 2013, Groundwater Depletion in the United States, 1900-2008).

JTI028, again a USGS document from 1998, Strategic Directions for U.S. Geological Survey Groundwater Resources Program.

Skipping ahead again, JTI047, USGS document, "What is Groundwater"? Open-File Report 93-643, reprinted from April 2001.

JTI048, by Blanc, et al., "Modeling U.S. water resources under climate change."

JTI049, it's an article, Drought-Stricken Texas Town Turns to Toilets for Water, by Shelley Kofler, May 6, 2014.

JTI050, Gillette Regional Water Supply Project, website accessed August 25, 2014.

JTI051-R, this is the pre-filed Rebuttal

Testimony of Dr. Richard Abitz.

And I believe that is it. Did I miss anything.

MR. PUGSLEY: Your Honor, I just wanted to clarify that the JTI051-R is amended from all contentions to 1 and 3.

CHAIRMAN BOLLWERK: 1 and 3, okay. And again because there's not going to be any objection to it, we're going to admit it right now and then it will be evidence when we talk about Contention 3. JTI051-R.

MR. PUGSLEY: Yes.

CHAIRMAN BOLLWERK: All right, so all those pre-filed exhibits as I have identified are now marked for identification.

(Whereupon, the above-referred to documents were marked as JTI001-R, JTI002, JTI006, JTI009, JTI010, JTI011, JTI012, JTI013, JTI014, JTI015, JTI016, JTI017, JTI018, JTI019, JTI020, JTI021, JTI027, JTI028, JTI047, JTI048, JTI049, JTI050, JTI051-R for identification.)

Let's go ahead and admit them into the record. Any objections? Hearing none, all right, here we go one more time. JTI001-R, JTI002, JTI004,

JTI006 --

MR. PUGSLEY: Your Honor, you mentioned JTI004.

CHAIRMAN BOLLWERK: Oh, I'm sorry. I'm sorry. That is not correct. That is Mr. Larson's professional qualifications. Strike that. Thank you.

So after JTI002, we skip to JTI006, then JTI009, JTI010, JTI011, JTI012, JTI013, JTI014, JTI015, JTI016, JTI017, JTI018, JTI019, JTI020, JTI021.

Moving forward, JTI028. Did I miss that one before? Do we have that one marked for identification, I believe? That's the USGS survey. Also, JTI027 and JTI028.

And then skipping forward again, JTI047, JTI048, JTI049, JTI050, JTI051-R and I believe that's it. Those are all admitted into evidence.

(Whereupon, the above-referred to documents were received into evidence as JTI001-R, JTI002, JTI006, JTI009, JTI010, JTI011, JTI012, JTI013, JTI014, JTI015, JTI016, JTI017, JTI018, JTI019, JTI020, JTI021, JTI027, JTI028, JTI047, JTI048, JTI049, JTI050, JTI051-R.)

At this point, I think we have some

questions. I need to take a drink of water, I'm sorry.

JUDGE WHITE: Dr. Abitz, I'll let you know where we're going. I want to ask your opinion specifically about the pre-operational background for excursion monitoring to be established from the perimeter well ring. Then, of course, needless to say we're going to get involved in the screening interval issue and then also talk a little bit about the effect of drilling on the potential biasing of water to set baseline for restoration.

As we all understand that all of these can bleed over into issues that are best dealt with in our discussion of Contention 2 and Contention 3, so I'd really like to try and focus just on these background issues.

You've read a lot about the documents, I'm sure, with regards to the proposed method for establishing background for excursion monitoring using the constructed perimeter monitoring wells, using what are sampled from the perimeter monitoring well. Foregoing a lot of the issues about whether this is best done before the license or after the license, foregoing issues about how effective monitoring is going to be or what is going to be monitored, simply

the construction of those wells and the plan to collect samples for monitoring, do you have any issues with regards to that plan? In other words, if that plan were carried out correctly, is there a problem in the basic plan of sampling from the monitor wells to establish excursion monitoring baseline?

DR. ABITZ: I'm going to answer that in parts to make sure I understand where you're going with this. First part of the answer would be we're assuming the monitor well ring. The perimeter wells are screened through the entire ore zone thickness.

JUDGE WHITE: I believe we have just heard that that is going to be the case.

DR. ABITZ: And we also have heard that the monitor well ring circles the wellfield of interest. Therefore before mining, there are wells, perimeter monitor wells upgradient, downgradient and lateral. And since then the monitor well ring completely surrounds the ore zone. Some of those monitor wells may intersect the ore zone as it trends through the monitor well ring.

So if you establish baseline using all those wells, using the drilling and construction methods that they're presently using, there will be oxidation of the ore zone and those samples could bias

the results to high values that would result in large upper control limits for excursion.

JUDGE WHITE: Okay. Those values that would be biased, am I correct in assuming that they would be uranium and radium 226?

DR. ABITZ: And other redox sensitive elements such as arsenic, molybdenum, selenium.

JUDGE WHITE: Now I know that we'll be talking about the issue of monitoring indicators for lixiviant and I think we heard today that -- I've forgotten what it is. Is it sulfate? I'm sorry. You understand where I'm going with this. The plan is to monitor those constituents.

We can talk with regards to later Contention 2 about whether that's an effective way to monitor, but would construction of the wells affect baseline concentrations for those lixiviant indicators?

DR. ABITZ: I believe you're referring to the proposed monitoring parameters of chloride alkalinity and I guess electrical conductivity, and then with the exception of sulfate, I believe, in the deeper monitoring zone?

JUDGE WHITE: I believe those are the ones that are described in the documents.

DR. ABITZ: Again, I would not expect to see much variation in those parameters because they're not redox sensitive.

JUDGE WHITE: All right, so the construction of the perimeter monitoring wells, assuming the efficacy of that program of monitoring for lixiviant indicators, you don't see a critical problem if we agree that that's what they're going to do? In other words, if you agree that that's their plan, you don't think it's a faulty plan, given the fact that they plan to monitor primarily lixiviant indicators and not uranium or radium as excursion indicators?

As I said, we can talk about whether that's valid or not.

DR. ABITZ: I believe there still is a problem with it in that an UCL is established for every parameter on their list, so if the event there is an excursion, then they may need to go and look at other elements and if those elements aren't properly determined, for example, the redox sensitive elements, then they would possibly conclude that there is no problem with uranium or radium or indeed there is a problem. So I still think there is a problem with the way that is handled.

JUDGE WHITE: Let's move on to this issue of the screening interval and these, of course, we're talking now about sampling within the wellfield and these are samples that would be used to establish so-called CAB that would be used to set baseline or benchmarks for post-mining restoration.

You've heard justification for collecting samples through a narrow interval and one of those justifications was that fluvial sediments which are the host for the uranium mineralization have very strong vertical anisotropy which greatly inhibits the vertical movement of water within the aquifer. Do you agree that there would be very little vertical exchange of waters within the OZ aquifer itself?

DR. ABITZ: I do not believe that over the period of two or three years of ISL mining there would be little communication between the vertical layers and the ore zone. I believe that you will see through diffusion and advection the entire ore zone horizon contaminated by mining fluids.

JUDGE WHITE: So are you saying that the groundwaters themselves don't have to physically transfer these chemical components, but the chemical components may, in fact, move or diffuse, in other words, the transport of these elements as not reliant

on the physical movement of the water vertically. Is that what that means?

DR. ABITZ: Both. There's advection which is the movement of the water. And then there's the diffusion. And when they're pumping and extracting water, I believe they will move water throughout that entire interval. The exempted aquifer is not just the ore horizon. It's the entire interval of the ore zone sand. That is the exempted aquifer and it would not be exempted if it was not going to be impacted.

JUDGE WHITE: Are you aware of any studies that have shown in similar types of sediments that there's significant vertical movement of mineral variant lixiviant beyond the ore zone?

DR. ABITZ: Well, we know based on the excursion history at ISL sites that indeed the mining fluids do extend and go beyond the monitor well ring. And since the monitor well ring is screened through the entire sand thickness, we know that entire thickness is impacted.

JUDGE WHITE: In your opinion what thickness of screening interval within the OZ aquifer by wells that are collecting water to establish CAB would be appropriate?

DR. ABITZ: I believe that will vary from

place to place because of the thickness of the ore zone sand is not constant across the area. It varies. So the thickness would be determined by their boring logs that show the thickness of that horizon.

JUDGE WHITE: Am I correct that within the entire -- am I correct, first of all, the OZ aquifer, I believe, has an average thickness of about 150 feet. Is that about right?

DR. ABITZ: That sounds approximately correct.

JUDGE WHITE: Within that there are -- is that from the reading there, shale horizons that are sort of a good deal less permeable than the sand horizons. What sort of thickness within the ore zone bearing sands would be reasonable to constrain this movement that you've already described by advection and by diffusion? And again, I know that you wouldn't have an exact number, but would it have to be the entire 150 feet thickness or are we talking about 20 feet on each side of the ore bearing horizon or do you have any idea?

DR. ABITZ: Again, it goes back to the exempted aquifer being the entire thickness of the ore zone sand. Therefore, you need to collect a representative sample from that entire thickness and

you could do that with a single stream through that thickness or from multiple intervals through that thickness.

JUDGE WHITE: Finally, with regards to this issue, are you aware of any feasible engineering solutions to the problems raised by Mr. Knode with regards to sampling a wider interval through the OZ aquifer and then being able to recover that well for mining purposes without causing undue issues? Or would you simply have to drill a separate well for sampling and then abandon it for any use as a mining well?

DR. ABITZ: I believe you would just have a separate well for monitoring. That's correct.

JUDGE WHITE: Okay. That's all I have on the screening issue.

Judge Cole, do you have anything on this for Dr. Abitz?

JUDGE COLE: Yes, just a couple of questions. With respect to the problem of advection and diffusion. The operating system, they maintain a hydraulic gradient between the input and the exit to try to control the flow through that area. If this is properly operated, shouldn't this minimize the problem of advection and diffusion and would the lixiviant

that enters into this area pass over to be collected and rather than diffusing and moving elsewhere, would this control it? Would this minimize the problem that you're talking about?

DR. ABITZ: The hydraulics of operating a wellfield are very difficult to discuss here because of the complexity of the stratigraphy. I don't think a simple model captures accurately what happens in a complex fluvial aquifer. I do not know all the assumptions they made in their model, but I'm guessing it's a fairly simple model with the exclusion of all the clay layers and silt layers in the sand zone that could affect the transport. So the model is saying they can control the fluids. And what's really happening are probably two different things. And I don't believe there's any way you can keep the entire sand horizon from becoming contaminated from mining fluids.

JUDGE COLE: If you had a hydraulic gradient that can halt the movement of the fluid by virtue of it being there, it's going to move high elevation to low elevation in the hydraulic grade line and wouldn't that tend to maintain fluid in that flow system and minimize the problems that you're talking about if the system is properly operating?

DR. ABITZ: Under ideal conditions, perhaps, but there's never that situation. Over two or three years of operation, wells are shut down for maintenance. They could have problems where they shut them down, so it's not a 24/7 throughout the entire production period. So I don't think there's any way you can stop the fluids from moving through the entire sand thickness.

JUDGE COLE: Thank you.

JUDGE WHITE: I'd like to move on to the effective wellfield construction on groundwater quality used for restoration background -- for establishing restoration background.

In some of the testimony that you've written, there's been discussion about how construction of the entire wellfield will bias baseline water quality analyses owing to the introduction of oxygen into the aquifer. We've heard today that the wells that will be drilled to sample water to be used to establish CAB will be drilled prior to the wells that are to be used for both introduction of lixiviant and withdraw of pregnant fluids. In your opinion, first will that help minimize the issue that you've raised because in effect, the entire wellfield won't be constructed

prior to the collection of these samples. And secondly, will it minimize it enough to alleviate your concerns?

DR. ABITZ: Stepping back a bit, the number of exploration bore holes that have been placed in the wellfield prior to the monitor well ring is sizable, hundreds. So there is quite a bit of disturbance prior to even putting the monitor well ring in. The monitor well ring before the wellfield is good, but there still has been disturbance of the aquifer prior to putting the monitor well ring in. And the monitor well ring itself will no doubt cross over the ore trend and there will be monitor wells that will disturb the ore zone when those are placed and developed.

JUDGE WHITE: And then I take it that drilling the wells, even if drilling -- also drilling the wells that are to be used within the wellfield for sampling water to establish CAB which is in the wellfield itself and I'm talking about the perimeter monitoring wells, I guess if I can paraphrase your answer that yes, collecting those samples prior to construction of the entire wellfield can reduce that problem, but it's certainly not going to eliminate it. Is that what you're saying?

DR. ABITZ: That's correct. And again, we're talking about a sample from a well. We're talking about impacts to the ore zone where that well was placed. Certainly, the impacts do not extend to the entire aquifer like we have heard earlier. We're talking about samples taken from a well and that sample being impacted.

JUDGE WHITE: So how big an area around the bottom of that well do you think is going to be impacted with this oxidation effect?

DR. ABITZ: I don't believe that's a question that's easy to answer. You have mechanical disturbance where you're grinding the ore into a finer surface area and we don't have particle size analysis to show what the surface is before and after. And also, I don't believe we have any mass balance on the amount of oxygen that was delivered down into the ore zone. So without that information it's very difficult to say.

JUDGE WHITE: We've read in rebuttal testimony that the level of groundwater plays a role in how effective the drilling is in oxidizing the water at the ore site. And it's asserted that if the groundwater level is well above the ore zone, the effect is minimized. Can you comment on that?

DR. ABITZ: I cannot comment on it because I don't fully understand the mechanism behind that argument.

JUDGE WHITE: There's another argument that's related to that, that talks about the mechanism of air injection and asserts that the air injection mechanism actually takes place well above the ore zone and not within the ore zone itself and for that reason introduction of oxygen from the air injection is essentially negligible in the ore zone. Do you have any comment on that?

DR. ABITZ: I don't believe that's the case because regardless of whether it's directly in the ore zone or not, bubbling air through a column of water oxygen will diffuse through that water.

JUDGE WHITE: Would it diffuse a hundred feet downward through that water still?

DR. ABITZ: That will depend on the pressure of injection and the temperature and how long it takes place. So without those parameters, it's difficult to say.

JUDGE WHITE: The drilling will be assisted by -- it will be using mud drillings, so it will be assisted by the use of bentonite muds. Is there any issue that you're aware of for this

oxidation situation that can arise from the use of bentonite muds as a drilling medium?

DR. ABITZ: Well, generally they use oxygenated water along with the drilling muds and that will deliver a source of oxygen ten to the orders of magnitude higher than what is present in reducing the environment with uraninite ore deposits.

JUDGE WHITE: So am I correct that the bentonite is simply a ground mineral that's carried as a slurry within water that's collected at the surface?

DR. ABITZ: Correct.

JUDGE WHITE: And injected downward. And you're saying that the oxygen content of that water that's the medium carrying the ground bentonite will be introducing oxygen?

DR. ABITZ: Correct.

JUDGE WHITE: I see. Judge Cole, do you have any questions about this issue for Dr. Abitz?

JUDGE COLE: No, not at this time.

JUDGE WHITE: That concludes my questions.

JUDGE COLE: I have some additional questions for Dr. Abitz.

CHAIRMAN BOLLWERK: Why don't you go ahead, Judge Cole, and then we may come back to a different subject for a couple of minutes.

JUDGE COLE: Okay. Dr. Abitz, do you acknowledge that in its review of Strata's application for compliance with the Atomic Energy Act and the NRC safety regulation, the staff found that the empirical data on groundwater quality collected by Strata was consistent with the guidance in Section 2.7 of NUREG 1569 Standard Review Plan for in situ enriched uranium extraction license application?

MR. FETTUS: Your Honor, Judge Cole and Judge Bollwerk, that question calls for a legal conclusion.

MS. ANDERSON: It also calls for testifying to the opinion of the other party.

CHAIRMAN BOLLWERK: I'm sorry?

MS. ANDERSON: It calls for testifying to the opinion of the other party. It's not Dr. Abitz' opinion.

MR. PUGSLEY: We would disagree with that conclusion first that it calls for a legal conclusion. Non-lawyers follow NRC guidance. They don't require legal opinions to follow NRC guidance so this is -- sounds like a question that's based on -- would be asking -- based on Dr. Abitz' experience.

JUDGE COLE: But he's read all the documents. He knows what the applicant and what the

staff found. I assume he's read the documents. Does he agree that that's what they stated?

CHAIRMAN BOLLWERK: So all you're asking, Judge Cole, is it his understanding this is what the staff did?

JUDGE COLE: Yes. The applicant and what the staff found.

CHAIRMAN BOLLWERK: Basically, can you answer the question?

DR. ABITZ: I'll answer it in this form. The guidance is the guidance. I believe criterion 7 states that complete baseline information will be collected and reported. Complete baseline information means a quantitative analysis of baseline conditions prior to disturbance of the aquifer. So what the guidance says and what the criterion 7 says may be different things, but I do not believe complete baseline information was collected or reported.

CHAIRMAN BOLLWERK: All right.

JUDGE COLE: Does the staff believe that it was done?

DR. ABITZ: I'm sorry, Dr. Cole, I didn't understand that.

CHAIRMAN BOLLWERK: The question was do you believe the staff believes that it has complied

with all the appropriate guidance and regulations?

DR. ABITZ: It doesn't matter what I belief about the staff. I can just tell you what I believe is right.

CHAIRMAN BOLLWERK: All right.

CHAIRMAN BOLLWERK: Any other questions, Judge Cole?

JUDGE COLE: Let me look at this list a minute. Do you acknowledge that Strata's NRC license and named conditions included condition N.6, 11.3 and 11.4 requiring Strata to provide additional data relative to determining groundwater quality and groundwater restoration standards?

DR. ABITZ: Again, I'm not sure I understand the direction of the question, Dr. Cole.

JUDGE COLE: Well, the license contains conditions telling Strata what they have to do, what they have to provide. Are you familiar with those requirements?

DR. ABITZ: I'm familiar with the requirement that says complete baseline information needs to be reported and I do not believe that has been done.

JUDGE COLE: All right, sir, I understand your position.

JUDGE WHITE: I have one other question that you can clear up for me. In your prefiled written testimony, you refer to RCRA and CERCLA sites and I must admit I'm not terribly familiar with these, looking them up on Wikipedia.

CHAIRMAN BOLLWERK: If you read it there, it must be true.

JUDGE WHITE: Yes, that's why I mentioned that just to make sure you know the source of my knowledge. Some of these sites, I'm not sure which are what are popularly known as Superfund sites, is that correct?

DR. ABITZ: Yes, CERCLA sites, yes.

JUDGE WHITE: My understanding of these places, these are places that have been very badly impacted by earlier industrial activities, mining or many of them are mining, but some of them are other kinds of things. And so it might be assumed that the groundwater at these sites is badly degraded. And so it's still not clear to me how collecting background for cleaning up a site that has already been badly degraded relates to collecting background for a site at which the industrial activity has yet to take place, if you follow me.

DR. ABITZ: I do.

JUDGE WHITE: Can you clarify that for me?

DR. ABITZ: Absolutely. I think there's confusion about that. It's not RCRA or CERCLA or mining or ISL. That has nothing really to do with those specific regulatory programs. Baseline or background is just that. There's really a proper way to do it. It's the natural condition prior to disturbance and the proper scientific and statistical methods apply across the board the same way. There's a right way to do it and it doesn't matter if you're doing it for RCRA. It doesn't matter if you're doing it for CERCLA. It doesn't matter if you're doing it for ISL uranium mining. It's the same fundamental principles, scientific and statistically, apply. So it was just to give an example of what other rigor is backed by more science and statistics at RCRA and CERCLA sites relative to the ISL industry.

JUDGE WHITE: I see. Thank you.

CHAIRMAN BOLLWERK: That's all your questions.

Judge Cole, did you have anything else?

JUDGE COLE: No.

CHAIRMAN BOLLWERK: All right. Then at this point, I do have some questions, but again, I'm going to defer them to the additional panel I think

we're going to have at the end. At this point, if you want to take about a 15-minute break and think about any cross examination questions you might have that you would propose the Board ask. It's about 5 'til 4, so we'll say 4:10, that's 15 minutes, I believe.

(Whereupon, the above-entitled matter went off the record at 3:56 p.m. and resumed at 4:11 p.m.)

CHAIRMAN BOLLWERK: All right. We've received some proposed cross-examination questions. The Board is now going to recess briefly to go and read those and discuss them with Judge Cole. We should be back hopefully in 15 minutes.

Just to let you know what the next step will be, we will obviously talk with Dr. Abitz about any of the questions that we are going to ask.

The plan will be to have all the parties' witnesses take the witness stand at one time. We have a series of questions that we'd like to ask with everyone seated, the idea being we will direct a question to one of the parties' witnesses and that party can respond. Then the other party will have an opportunity to respond to the answer that they've heard.

So that's the protocol we'll do after we ask any further cross-examination questions for Dr.

Abitz.

All right. Let's go ahead and take our recess. We'll be back in hopefully no more than 15 minutes.

(Whereupon, the above-entitled matter went off the record at 4:12 p.m. and resumed at 4:27 p.m.)

CHAIRMAN BOLLWERK: All right. We're back after a break for the Board to look at and consider the questions proposed by the parties for cross-examination. We do have several to ask Dr. Abitz.

Let me mention just as a heads up that in terms of the panel that we're going to be putting together after Dr. Abitz, most of the questions are going to relate to the prefiled testimony -- I'm sorry, the rebuttal prefiled testimony that was filed by the parties.

So to the degree that you want to pull those documents up, that's kind of what the focus of it will be in terms of the questions that will be asked. Perhaps not exclusively but probably most of them.

Let me just check. Dr. Cole, are you still there?

JUDGE COLE: Still here.

CHAIRMAN BOLLWERK: All right. Very good.

First question, Dr. Abitz. Could you please explain in more detail how one establishes pre-disturbance ground water quality at a contaminated CERCLA or RCRA cleanup site?

Is there anything differently you would do to establish a scientifically defensible baseline for an ISL site?

DR. ABITZ: I'll answer the last part first and answer that as no. A baseline or background is just that. It's the same regardless of what type of regulatory environment you're in.

CHAIRMAN BOLLWERK: Okay.

DR. ABITZ: The way I would go about that and the way that pretty much the most scientific and statistically valid methods have been well established, you need to delineate that area of concern. For an ISL operation it would be the exempted aquifer. That would be the area of concern, whatever area that is.

You would put a grid over it and randomly locate well locations. You would place wells at those random selected spots.

In the case of uranium mining, you have the special case where you have redox-sensitive areas. So the common drilling techniques won't work there

because you'll disturb the ore zone. If you don't have the uranium ore body then you can use the common drilling techniques.

You develop your wells. And then you collect samples, representative samples from a properly screened horizon through the thickness of the sand. Or you have multiple intervals through the thickness.

You would need to collect at least generally a couple of years worth to make sure you can distinguish seasonal fluctuations. Collecting four samples over eight weeks does not give you seasonal fluctuation. It should be quarterly for a couple of years.

Then you would apply proper statistical protocols to evaluate the distribution of the data and determine what statistical methods you can use to come up to measuring the central tendency of the parameters.

CHAIRMAN BOLLWERK: All right. Just as a question, mostly RCRA and CERCLA sites are obviously ones where there's a lot of environmental issues there. Do you really need to wait two years?

I mean, at lot of times they would like to start -- once they get the money they like to start

cleaning them up. Is that an issue?

DR. ABITZ: No, it's not.

CHAIRMAN BOLLWERK: Like we're on the front side of an ISL proceeding but they're on the back side. They've got a different issue.

DR. ABITZ: Generally contamination has been at those sites for years if not decades. So a couple more years to establish baseline is not a big deal, especially because of most of those baseline wells will be upgradient?

CHAIRMAN BOLLWERK: All right. Any other questions from the Board on that one?

All right. Second question. Are the concerns you raised regarding the approved methods that Strata will conduct to determine the CAB and UCLs, are those concerns that are unique to the Ross project or are these concerns that you have with the ISR industry and the NRC's licensing process in general?

DR. ABITZ: I would need to know what you mean by concerns.

CHAIRMAN BOLLWERK: You've raised concerns about the methods of drilling, where the wells are being placed, how long they're being monitored, some of the things you just said about the CERLCA site.

I guess the question that's being asked is, are these unique to Ross or is this something that you'd be concerned about if you were at Powertech or you were at Pickwater, any ISR site?

DR. ABITZ: Okay. I think the concerns are valid everywhere, that you follow proper scientific and statistical protocols.

I believe the ISR industry has the additional burden of drilling into an ore zone that becomes oxidized using standard drilling and well development techniques. So you have an added burden of trying to determine what the true baseline is when they drill through an ore zone. You don't see that at other sites because you don't have that condition.

CHAIRMAN BOLLWERK: But in terms of this industry, it is in your view something that's across the industry?

DR. ABITZ: It is, yes.

CHAIRMAN BOLLWERK: A couple of other questions. What do you think the rate of diffusion might be relative to advection, that's A-D-V-E-C-T-I-O-N, to transport the chemicals in the aquifer?

DR. ABITZ: I think that question is not possible to answer without more data.

CHAIRMAN BOLLWERK: All right. Is it or

isn't it true that bentonite mud forms a film that is measured in 1/30th of an inch, an extremely narrow zone?

DR. ABITZ: I don't understand where the question is going. I don't know how to answer that.

CHAIRMAN BOLLWERK: Okay. Can you help at all? No? Okay.

The next question. What is the source, and I believe by the word source they mean regulation guidance, for defining complete baseline as a statistically derived value?

DR. ABITZ: Complete baseline is a quantitative thing. It has to be because it's a natural state that exists prior to disturbing an aquifer.

The only way you can do that is by quantitative analysis. How complete is quantitative by nature?

CHAIRMAN BOLLWERK: All right.

JUDGE WHITE: Would you -- is there -- I'm not sure if we're looking for a documentary source, meaning I'm not sure what that question is getting at.

But our interpretation was it was getting at, is there a set of regulations or a set of protocols with your CERCLA example, then reference a

set of protocols that is memorialized in regulation or in guidance for those sites that you would like to see and applied to ISL sites?

DR. ABITZ: Yes. I believe I cited that as one of my references. It would be the EPA Unified Guidance on Groundwater Monitoring.

JUDGE WHITE: Okay. I'm not sure what they were asking. But if they were asking for that, then good.

CHAIRMAN BOLLWERK: The last question. What do you calculate as the ground flow velocity and how will drilling the well field wells affect the perimeter monitoring ring 400 feet away under pre-operational conditions?

DR. ABITZ: That's not a question I can answer on the spot. I'd have to go back and look at what data would be needed for that type of calculation and perform it outside of this spontaneous arena here.

CHAIRMAN BOLLWERK: All right. Judge Cole, anything that you have?

JUDGE COLE: No.

CHAIRMAN BOLLWERK: All right. Then that concludes the Court's cross-examination of Dr. Abitz on his own.

If you'll stay there however, we're going

to bring up some other witnesses.

Basically what we'd like to have is all the witnesses before both SEI and the staff that were in panel and sworn in for Contention 1 to come forward and take a seat at the table. Make yourselves comfortable wherever that might be in the first or second row.

What I'm going to do is ask a question. I'll indicate which panel it's intended -- it's directed at. Whichever member that panel feels is appropriate can answer it.

Then once we've gotten the answer from the person who -- the panel whom the question is directed, then any of the other folks that are there from the other parties should feel to respond to the response they've heard. If nobody has anything to say then that will be the end of it.

We're hoping actually to give you all an opportunity to sort of discuss the issue being raised by the questions.

Again, I would indicate that these are ones that have come from the rebuttal testimony that was filed by the party. At this point we really don't have the sort of interaction that we -- we have prefiled testimony and then rebuttal testimony. We

want the parties to have an opportunity to interact.

One thing I would do is to remind you all the microphones are very directional. There is a number of them there. If there is not one in front of you, please feel free to share with someone or just pull the mic over. But you do need to have the mic in front of your mouth if there is a response you want to make.

Once we face with the initial panel's response I will ask do any of the witnesses for the other parties have anything to say. You'll indicate by raising your hand or whatever. We'll try to call on everybody and make sure everybody that has something to say gets an opportunity.

Again, if the folks from the original panel have something further that they want to say based on the answers they heard, we'll sort of continue until we have kind of played the thing out.

Any questions about what we're going to do? I don't think it's complicated. Hopefully everyone lets everybody say their piece. It will be organized and not turned into sort of a free-for-all.

Okay. The first question is for the SEI panel.

In his response to Question 15 of his

rebuttal testimony, Dr. Abitz asserts relative to Mr. Knode's rebuttal testimony regarding bias that the ISL industry has not been able to provide any evidence to support the position that natural attenuation will return groundwater to baseline conditions in 20 to 30 years.

I'd like to know what SEI has to say about that statement.

MR. KNODE: Yes. First of all, as long as 30 years ago NUREG-3136 discussed natural attenuation using core from iso deposited in South Texas. So to think that this is something that's new or has not been considered in decades is surprising to me.

Additionally, if you'd look at NRC037 there's a peer reviewed document. Just reading one of the lead-ins to it, relatively low concentrations of key species such as uranium observed in monitoring wells outside the mined area indicate that natural attenuation likely plays an important role in controlling mobility of redox-sensitive contaminants.

As was mentioned in our opening testimony -- excuse me, our position statement by our legal counsel, there are several EPA documents that discuss modern natural attenuation of inorganic contaminants in groundwater. Those include things like radium,

radon, uranium.

So these are -- natural attenuation is everywhere in literature.

CHAIRMAN BOLLWERK: All right. Are you finished for this point?

MR. KNODE: For now.

CHAIRMAN BOLLWERK: Okay. Let me ask either the staff or Dr. Abitz if there's anything they'd like to say in response to that?

MS. MOORE: Could you repeat the question?

CHAIRMAN BOLLWERK: Sure. The question basically was, in his rebuttal testimony Dr. Abitz asserted relative to the SEI rebuttal testimony regarding bias that the ISL industry had not been able to provide any evidence to support the position that natural attenuation will return groundwater to baseline conditions in 20 to 30 years.

I think we just heard SEI explain why they thought that wasn't the case, that there was support for that.

MS. MOORE: I do have something to add, Your Honor.

CHAIRMAN BOLLWERK: Okay.

MS. MOORE: I would just like to note that the final SEIS allows for the fact that groundwater

may not be restored to baseline. And it discusses the fact that criteria in 5(b)5 allows for restoration to baseline to the constituent concentrations in Table 5(c) and also in ACL.

We base our conclusion and the SEIS on the applicant or the licensee being able to meet any of those criteria.

CHAIRMAN BOLLWERK: All right. Anyone else from the staff want to say anything?

Yes, please.

DR. JOHNSON: Yes, Judge Bollwerk. I'd like to just add my concurrence to the documents that were cited by SEI on natural attenuation.

I'd just like to highlight just a bit on the EPA document that recently was published on natural attenuation on radionuclides. They go into quite a level of detail on those mechanisms of natural attenuation for uranium as well as other radionuclides and provide a long list of references to that end. Not just from the uranium mining and milling end, ISR operations, but also uranium in other settings.

So the record is pretty deep in terms of examples of how natural attenuation for uranium works in the environment.

MR. FETTUS: Your Honor, could we have the

site to the NRC exhibit on the EPA document that you're referencing?

MR. HARPER: It's not in the list.

MR. FETTUS: Oh, it's not on the exhibit list?

MR. HARPER: We can add that exhibit at the end of the hearing, Your Honor.

CHAIRMAN BOLLWERK: Sure. If there's something we need to supplement the record with, we certainly can.

MR. HARPER: We'll do that by this evening.

MR. FETTUS: This is not a document that we've reviewed or seen before.

MR. HARPER: We don't have the document with us, Your Honor. We can provide it to the parties this evening. That is unfortunately the best we can do.

CHAIRMAN BOLLWERK: Yes. Let's go ahead and maybe you can get a copy of it.

You want to take a look at it obviously?

MR. FETTUS: Yes.

CHAIRMAN BOLLWERK: We'll decide tomorrow if it's something we need to admit or not.

MR. FETTUS: Thank you, Your Honor.

And actually if you could provide it with specifically what you'd like us to look at so we don't have to look at --

MR. HARPER: Right. Absolutely.

CHAIRMAN BOLLWERK: A page reference or whatever that would be. That would be terrific.

If we do decide to go ahead with its admission, we'll probably need to have it filed. Let's go ahead and just circulate it and decide whether we even need to put it into the record.

All right. Anyone else?

Dr. Abitz, this was your question. I certainly want to offer you the opportunity. You don't have to say anything if you don't want to. It's not required. But if you'd like to, this would be --

DR. ABITZ: I'll briefly respond. I don't believe there is evidence that I've seen. Perhaps there is in this document that they'll provide.

But generally, once a site has been reacclimated to alternate concentration levels there is no monitoring required. So I'd be very interested to know what the levels are for uranium in ISL sites that have been reacclimated to alternate concentration levels. Because I believe monitoring stops then and there is no long-term monitoring.

So if there's long-term monitoring beyond sign-off of reclamation by the NRC, I'd love to see the data.

CHAIRMAN BOLLWERK: Okay. Yes?

DR. JOHNSON: Judge Bollwerk, I'd like to say that the reference, I think it was 047, NRC047, the Borch document, that's exactly what that is. That restoration was approved in that well field.

And then the requirement -- and I believe the requirement came from the state of Wyoming. But the requirement was for extended monitoring. They selected -- certain wells were selected for that monitoring.

That document prepared by Borch and others is an interpretation of the data that were collected over, I believe it was seven years, maybe five but in that area. It's those data collected after reclamation was approved or restoration was approved that formed the basis of the conclusion that natural attenuation was operating.

JUDGE WHITE: Excuse me, Dr. Johnson. That's NRC037, that's what you were just referring to?

DR. JOHNSON: Yes. Excuse me, 037 not 047, my mistake.

CHAIRMAN BOLLWERK: Are you familiar with

that document, Dr. Abitz?

DR. ABITZ: I am not. I can't say off the top of my head. I will look at it.

CHAIRMAN BOLLWERK: All right. Anything anyone wants to say further on that particular question?

MR. LAWRENCE: I have an observation I'd like to make.

CHAIRMAN BOLLWERK: Yes.

MR. LAWRENCE: Dr. Abitz contends that the active drilling with oxygen tends to increase uranium locally at the well or change the uranium concentrations in the aquifer.

But that that impact has shown to subside over time, doesn't that imply that there's some type of attenuation going on if that contention is correct?

It seems like he has to believe that there must be attenuation when the conditions change from oxidized to reducing.

DR. ABITZ: I do believe that there is reduction if there is a mild disturbance.

But what we're talking about here is attenuation after years and years of ISL mining where you have oxygenated lixiviant moving through the sand formations and you've really destroyed the redox

conditions. So it's two completely different situations we're talking about.

CHAIRMAN BOLLWERK: All right.

DR. JOHNSON: Judge Bollwerk?

CHAIRMAN BOLLWERK: Surely. I'm sorry? Go ahead if you're ready.

DR. JOHNSON: I would just like to add one thing. Natural attenuation of uranium occurs by two mechanisms, two primary mechanisms.

One of them of course is the one that we've been talking about most. That is the reduction from the soluble uranium-plus-six to the insoluble uranium-plus-four.

But in oxidized areas it can also be attenuated by absorption on iron hydroxide. And that mechanism is discussed by EPA in this document that we will show you as well as some of the other reports, the documents that have been -- I believe some of them are the Intervener's exhibits.

But it's a mechanism that has been studied more and more recently about an alternative way for attenuation to occur in the oxidized areas.

DR. ABITZ: I agree with what, I believe it's Dr. Johnson, stated.

But the part that's missing from that

story is over the period of mining you have passed very high concentrations of uranium over the iron oxyhydroxide surfaces. And those sites become filled.

Once that happens they lose their capacity to absorb further. So there is a limit to what can go on iron oxyhydroxide. No one has demonstrated whether there's further capacity after ISL mining has occurred.

So it can occur. But they reach capacity and at that point they're no longer useful.

CHAIRMAN BOLLWERK: All right. Anything further on this subject from anyone?

MR. SCHIFFER: This is Ben Schiffer. I'd like to bring this a little bit closer to home.

I understand that this project has benefited from the Nubeth Research and Development Project which operated well over 30 years ago and was documented to have been restored. The license was terminated.

We have in fact been able to go back and measure the concentrations of radionuclides and other parameters from the original five-spot pattern.

The results that we see today indicates that the concentration of these parameters are easily at or below the concentrations that they were when the

baseline occurred back in the 70's. So I think for all of us that's a very good example of long-term monitoring of a site.

Those data are in the license application and acknowledged well in the FCIs that NRC staff put together.

DR. ABITZ: I would comment on two things there.

First, the Nubeth project was a very short duration. It was not several years. I believe it was less than a year, maybe several months.

Second, the baseline values that were determined at Nubeth were not proper baseline values. They were biased to high values. So therefore there was no proper baseline established to compare restoration values to.

CHAIRMAN BOLLWERK: All right. Anything further from anyone?

All right. Thank you very much.

Do either Judge Cole or Judge White have any questions?

JUDGE WHITE: No questions from me.

JUDGE COLE: No.

CHAIRMAN BOLLWERK: Since the issue at Nubeth has come up, let me pose this question. This

is for the staff to respond to initially.

I'd like to know what your response is to Dr. Abitz's response to Rebuttal Question 12, that the staff had provided no response to his direct testimony that the impacts of mining at the former Nubeth site are clearly visible in the uranium versus radium 226 plot to groundwater samples that was provided in his direct testimony.

DR. JOHNSON: Judge Bollwerk?

CHAIRMAN BOLLWERK: Yes?

DR. JOHNSON: I'll begin. That whole argument, that plot and the associated argument, makes the assumption that there is a consistent and direct relationship between uranium and radium in the groundwater. That is just simply not the case.

If you look at any data set where you have both uranium and radium, and there are some examples that we can talk about if you'd like, there's not a consistent relationship. Radium doesn't follow uranium in the way that that argument about that ratio requires.

So it just strikes me that there's just no substance to that argument, using that ratio to try to establish that there is some residual from Nubeth. And we can go on about that.

But the concentrations of radium were very high in the baseline data that was collected for Nubeth. They were just really high. And the uranium was high. It's roughly in the range that it's in today.

So the reason the ratios don't work is because for some reason the radium concentrations and those Nubeth wells were very high compared to the uranium. And it's a very different situation today. That radium was there before any mining took place.

So it just doesn't seem to -- it just strikes me that the fundamental premise that that argument is based upon that uranium and radium -- that radium follows uranium in this predictable, consistent way just isn't accurate.

DR. ABITZ: I believe there is a misunderstanding on this plot. This plot is showing two things.

If Dr. Johnson believes I'm saying radium follows uranium then I must have been very poor in the way I stated it. Let me clear it up here.

Radium does not move like uranium. The point being made here is where you disturb an ore horizon, uranium and radium will both be present at elevated concentrations because when you oxidize the

ore you release radium.

But since uranium moves and radium does not move far from where it's oxidized, the uranium concentrations will increase downgradient but radium will not.

That's what's being shown here. You can see the areas impacted by the lixiviant. Where oxidation occurred you have uranium and radium high. Where radium transported out of the area you just have uranium at high values with low radium values. So that's what's being shown here.

CHAIRMAN BOLLWERK: All right.

DR. JOHNSON: Perhaps when I use the word move, I didn't mean physically move. What I meant is that my understanding in this plot means that when uranium is released there's always a predictable, constant proportion of radium that follows that. Not follows physically but is also released.

That's just simply not the case. When you look at the initial water sampling from a multitude of these wells, look at -- the Nubeth wells were put in in 1977 and 1978 before mining occurred.

You look at the radium -- uranium-radium ratio and then you look at the ones today. It's not the uranium that has changed in any significant way.

It's the radium. And the radium was higher. And this was pre the R&D so it's pre-mining of any sort for Nubeth.

So that ratio is not constant even before any ISR activity.

DR. ABITZ: Again, I don't understand the ratio. It's not to do with the ratio.

It's simply that radium and uranium will be elevated where the ore is oxidized. Where the ore is not oxidized uranium will be transported downgradient and you will see high uranium without radium.

So I'm not certain I understand what Dr. Johnson is getting at with the ratio.

CHAIRMAN BOLLWERK: Judge White, did you have something you wanted to say?

JUDGE WHITE: No.

CHAIRMAN BOLLWERK: No? All right.

Any further response on that question?

Yes?

MS. MOORE: I would just like to add that the affected environment presented in the EIS is the environment that existed just prior to Strata admitting its license application. That's the affected environment that we are trying to predict the

impact to.

In the cumulative impact section, that's where we take into account any past historical cumulative impacts that may have come from Nubeth or any future projects that may also impact those same resources.

CHAIRMAN BOLLWERK: All right. Anything further from anyone on that statement?

Let me ask one other question with respect to radium 226. This is for the staff to respond to.

What I'll mention is your response to Dr. Abitz's response to Rebuttal Question 10 regarding the lack of short-term changes with respect to radium 226 levels in samples from the six cluster wells.

If you need to take a look at his rebuttal testimony, feel free. I tried to make these questions sort of -- I was trying to be efficient. But maybe I was too cryptic in some instances.

Do you need to look at the prefiled testimony? You got it?

MS. MOORE: What page is that?

CHAIRMAN BOLLWERK: It's going to be Question 10 of the -- it's Rebuttal Question 10.

MR. FETTUS: Pages 8 and 9 of Dr. Abitz's rebuttal testimony.

CHAIRMAN BOLLWERK: Which is, I don't remember the number. Hold on one second and I'll tell you.

MR. PUGSLEY: 051-R.

CHAIRMAN BOLLWERK: It's JTI 51. I'm sorry. It's Question 10.

Can you reduce it to 75 maybe? Yes. There we go. Get to the right place and then we can blow it back up again. I think you need to go down a little further. There it is.

Does she need to scroll up a little bit?

DR. JOHNSON: I understand the question.

CHAIRMAN BOLLWERK: You understand the question?

DR. JOHNSON: Yes.

CHAIRMAN BOLLWERK: Okay.

DR. JOHNSON: I believe the question is that the staff did not respond properly to the depiction of the data, uranium data from the monitoring well clusters to show that over time -- the assertion is that over time four of the six wells, the concentrations decline from the very beginning of that two-year period to the end.

Is that correct? Yes? Okay.

The assertion is that those declines in

four of the six wells illustrate that they were more -- the oxidation perturbed the wells at the beginning. And then as the oxygen was consumed they slowly declined over time. That's the assertion.

Now, my interpretation of that is that the data is the data. And indeed one well, I think you could argue that it's so close to background or undetectable that it may not really show a decline. But certainly some show somewhat of a little decline.

But the part of that that I don't believe to be the case is that that illustrates the concern about introduction of oxygen, increased uranium, and then over time slowly decrease.

And I would say this because first of all, the one well that should be impacted the greatest by the introduction of oxygen and if that happened, and leading to an increase or spike in the uranium, was the one that has the highest concentrations of uranium.

But indeed in that well concentrations actually increased over time. Just a little bit but it certainly did not show a decline. So that pattern did not exist in that particular well.

Which, I would think that if indeed the premise about the introduction of oxygen leading to

this biased tie of uranium were valid, you would see it in that well. And you don't.

Secondly, in terms of utilizing that data in the job that were to do, which is the environmental impact statement, we looked at a range per the guidance for NEPA. We looked at the range of concentrations that existed in the site characterization, the prelicense site characterization, the maximum and the minimum.

For those constituents that had no or very few, less than detectable values, we calculated mean. The parameters of course that had a lot of less than detectable values, calculating mean isn't a very practical, useful exercise.

So how we used that data in the supplemental environmental impact statement was just simply to characterize and describe the groundwater of that resource in the area that could be impacted. So certainly using the maximum and minimum was sufficient for that.

Now, from the beginning of the eight quarters to the end of the eight quarters, that range, that maximum to minimum really didn't change appreciatively. So there wasn't any systematic change in that range either down or up over that time.

So those data were sufficient for our purposes. And to dive deep into some of these nuances of why the concentrations in some wells, not all wells but in some wells, were changing slightly over time was just really not relevant to preparation of the supplemental environmental impact statement.

DR. ABITZ: I think this goes to the fundamental issue on our differing professional opinions on what complete baseline is. I don't concur with Dr. Johnson's argument.

I think it's clearly visible on the plot that the ranges of max and min are different for the 2010 and 2011 data, with the exception perhaps of the 1418OZ well.

Also, we noted in my testimony that there is very clear evidence at the Goliad site in Texas that there was a decrease in uranium concentrations about a year after they put the wells in. So this is not something that happens at one spot.

And the purpose here would be to improve the collection of data to see what happens with these uranium values with time prior to any mining taking place.

CHAIRMAN BOLLWERK: Anything further you want to say, Dr. Johnson?

DR. JOHNSON: Just quickly.

CHAIRMAN BOLLWERK: Surely.

DR. JOHNSON: I'm not seeing it right now. But in our prefiled testimony there is one answer which actually looks at the ranges and how the range maximum to minimum changed from the beginning to the end of the eight quarters.

So that is established in our testimony. And indeed there was no systematic change to that.

CHAIRMAN BOLLWERK: All right.

DR. JOHNSON: It's A.1.10.

MS. ANDERSON: Your Honor, is that a rebuttal or trial?

DR. JOHNSON: I believe it's direct.

CHAIRMAN BOLLWERK: Let's see. The direct testimony would have been --

MR. PUGSLEY: NRC001.

CHAIRMAN BOLLWERK: NRC001? All right. Do we know what page approximately?

DR. JOHNSON: It's actually A.1.8, Section 2.

MR. PUGSLEY: It's going to be 001 and it looks like 19, Your Honor.

CHAIRMAN BOLLWERK: Okay. That would be the easiest way to find it.

DR. JOHNSON: That may have been a mistake. Let me just see if I can --

CHAIRMAN BOLLWERK: That's A.1.8.

DR. JOHNSON: I'm not finding what I had hoped to find here.

MR. PUGSLEY: Are we looking for A.1.8, Section 2?

DR. JOHNSON: Well, that's what I thought. But I'm not seeing --

MR. PUGSLEY: Section 1. That's 18, page 18.

DR. JOHNSON: Actually it's on page 18.

CHAIRMAN BOLLWERK: Okay.

DR. JOHNSON: And it's actually on A.1.8, Section 1. It's on page 18.

The uranium concentrations in the first quarter from the ore zone aquifers with monitoring wells range from 0.011, this is milligrams per liter, 0.011 to 0.096.

At the close of their eight quarters of sampling it was 0.006 to 0.104.

So the range actually increased slightly on both ends between the beginning to the end of the eight quarters.

DR. ABITZ: So that's as a range for all

wells?

DR. JOHNSON: For the supplemental environmental impact statement we were to describe the resource that would be impacted. And the description included the range of particular constituents that were found in that resource.

So the range, yes. This is the range of uranium that was found in the groundwater that potentially would be impacted.

DR. ABITZ: For all wells, not well by well? You didn't compare the ranges for well by well, you compared the ranges for all wells?

DR. JOHNSON: That's right.

DR. ABITZ: Okay.

DR. JOHNSON: Because the objective was to understand, to characterize that resource. So all of the wells would be included in characterizing that resource.

DR. ABITZ: Well, that's very different than my point. My point is that things change for each well on a well by well basis. Some of these wells are changing.

I'm not comparing the entire range of all wells. I'm comparing the ranges of each well independently to show the change. We're talking two

different things here.

DR. JOHNSON: Yes. My perspective is that was required by NEPA for the supplemental environmental impact statement.

CHAIRMAN BOLLWERK: All right. Anything else on this particular point?

The next point I'd like to go to very briefly is rebuttal questions -- this is again for the staff. Rebuttal Questions 4 and 8, which Dr. Abitz makes several points.

Basically he has explained to us just over the last 15-20 minutes about his views about proper statistical methods. In these questions he kind of again makes those points and also endorses the EPA Unified Guidance on Groundwater Monitoring.

I'm just sort of wondering as a general matter from the staff, is there something wrong with doing it the way for instance EPA does? Is there something that's inconsistent with what the agency is trying to accomplish? Is it something that's contrary to its health and safety mission?

What is the problem with what Professor Abitz is suggesting in terms of coming up with better, more effective methods of finding out this groundwater data?

It's a fairly broad -- to some degree I want to say it's a policy question. But he's making a very broad point.

I guess the question is, if there is a better way to do it why aren't we doing it? Or isn't this a better way and why isn't it? Maybe that's the question.

DR. JOHNSON: Maybe I could just start by saying why what we had, the data that was provided was sufficient for the purposes of the supplemental environmental impact statement. And then perhaps Mr. Saxton or Ms. Moore want to comment on the broader question.

CHAIRMAN BOLLWERK: I recognize the EPA unified guidance is different.

The question is, why isn't it applicable here other than it's different?

The NRC tries to use best practices I think. So if this isn't the best practice, why isn't it?

MR. SAXTON: Can you repeat the question? For the pre-license site characterization data?

CHAIRMAN BOLLWERK: Basically what we're trying to accomplish here, which is to find out what the best way is to find out what the baseline is.

MR. SAXTON: The baseline not being the critera 5(b)5 baseline, it's the pre-license site characterization?

CHAIRMAN BOLLWERK: Dr. Abitz has a point that what you're trying to do, whether you define it as baseline or -- his point is that the agency seems to be, I don't want to say arbitrary. But they're dividing this into two parts. And his point seems to be it's really only one part, you just need to do it the right way.

Am I putting words in your mouth?

DR. ABITZ: That's correct. You're correct.

CHAIRMAN BOLLWERK: He's pointed to the EPA guidance and he's pointed to other places where it seemed to support his view.

The question is, why don't these fit the NRC's model other than we have some regulations which may or may not be read that way?

If this is a best practice, why aren't we doing it? I guess that's the question.

And if it isn't, it must not be for some reason so what is that?

DR. JOHNSON: I think that part of the answer to that is to look at the purpose of why we're

collecting certain data.

For the purposes of NEPA and in the SEIS, the important feature was to describe the resource, in other words characterize the resource that could potentially be impacted. And then have sufficient data to characterize the impacts.

Embedded in that was not a purpose to establish remediation goals or restoration targets. That's not part of the requirement of NEPA and the environmental impact statement.

So the EPA unified guidance and others, the purpose of that often times is more focused toward establishing the remediation goals or restoration targets or what have you. But that's different than the purpose and the requirements that NEPA has for the environmental impact statement.

CHAIRMAN BOLLWERK: Okay.

MR. SAXTON: As far as the pre-license site characterization, our goal is just to verify the Applicant's conceptual model.

Basically they're taking the Lance Formation aquifer, subdividing it into what they characterize as the ozone -- the OZ aquifer, the DM aquifer. Because we discussed it obviously we understand what their conceptual model is.

And then they get their quality data and we evaluate what that is as far as the distribution. That will lay the basis for when they go through the well field and they actually get the groundwater protection standards.

Now, we don't do unbiased group sampling because the well field itself is -- it should be pretty close to the uranium ore body. Our goal is to get representative wells that are going to be impacted by the operations and characterize the data before mining or milling operations. Then once the operation is done, use those same wells to determine the restoration success.

So the goal isn't to get an unbiased evaluation that the MCO is above a certain level. That's not the purpose of groundwater protection standards. The groundwater protection standards are just finding what it is prior to the operations.

CHAIRMAN BOLLWERK: All right. Staff, I see you back there in the back. Someone from NCI wants to respond as well and then I guess we'll hear from Dr. Abitz if he has anything further to say. Go ahead.

MS. MOORE: I just wanted to add to what Dr. Johnson said regarding the purposes for the data.

In the NEPS review what we're doing is trying to determine or predict potential impacts. That's different than when you're actually assessing actual environmental impacts after some impacts have taken place and after operations have occurred.

It's that stage where you want to make sure that you have the specific data to compare the specific data that you have after operations. We are simply predicting potential impacts.

There's a difference as far as the type of data that you need at that stage. That's why the regulations clarify those two different types of data and why there's a difference between how you calculate those two types of data for those two different purposes.

I think sometimes when we say determine environmental impacts, sometimes they're talking about actual environmental impacts and sometimes they're talking about predicting potential impacts. We need to be clear on what we're saying because there is a difference between what data you need to do those two different analyses.

CHAIRMAN BOLLWERK: Okay. Thank you.

The gentleman from NCI wants to -- no? You grabbed the microphone but you changed your mind?

MR. DEMUTH: Judge Bollwerk, just if I could add to that. NRC staff and SEI both have clearly delineated in their testimony that licensing of an ISR facility is a phased process. As Mr. Saxon just iterated, it is process where you have different stages of data gathering and different objectives.

So at this stage of the process the data objectives were driven by the licensing process. And those are evaluated in the SER by NRC staff to determine whether the process can be safely conducted.

It is the NRC guidance NUREG-1569, Reg Guide 4.14 among others that drives that process, including the data collection and also discussions, meetings, guidance from NRC staff.

It would be inappropriate to take a CERLCA process and tell NRC staff that that's what Strata would use for a licensing process in the same way it would be inappropriate to go to a CERCLA site and tell EPA that we were going to use an NRC process as the guidance for data collection.

In addition, the CERCLA process that Dr. Abitz has referred to, it's a compliance process. It's not a permit process. So we're really comparing apples and oranges.

I think the key thing here is what stage

of the process are we at. NRC guidance and staff have directed SEI to collect certain kinds of data and demonstrate that it is sufficient for the purposes that's been evaluated by NRC staff, including their statisticians, and determined to be adequate.

CHAIRMAN BOLLWERK: All right. Anything further that staff wants to say? If not, I'm going to turn to Dr. Abitz.

DR. JOHNSON: Can I just add one thing, Judge Bollwerk?

CHAIRMAN BOLLWERK: Yes.

DR. JOHNSON: The other thing I believe he's mentioning is that this is a supplemental environmental impact statement, which means of course that it is tiered from the generic environmental impact statement.

The major criteria for doing the tiering is to determine and establish that this project fits within the overall characterization with the geology and the groundwater quality and so on that were evaluated in the GEIS, the generic environmental impact statement.

So that's another purpose of this initial review of the prelicense site characterization, to establish that it is consistent or comparable with

that evaluated in the generic impact statement.

And for that purpose the type of statistical evaluation that EPA uses, for example, to come up with remediation goals is simply not necessary.

CHAIRMAN BOLLWERK: Dr. Abitz, if you would like to say anything we're obviously here to listen.

DR. ABITZ: Yes. Thank you, Your Honor. I believe this gets back to the fundamental professional opinion problem we've been having here today.

Baseline and background are baseline and background. CERCLA, RCRA, or ISL, it does not matter. CERCLA or RCRA was just given as an example where robust scientific and statistical methods are used and proven to establish what the natural, undisturbed conditions in an aquifer are.

I read Appendix A criteria in 7 and 5(b). There is no discussion of two different backgrounds or baselines there. They say complete baseline information. To me that's a full-blown quantitative analysis with proper scientific and statistical protocols.

So I believe we're getting wrapped around the axle on something that doesn't need to be this

complicated. Baseline is baseline and it should be done properly at any site. It doesn't matter what regulations govern it.

CHAIRMAN BOLLWERK: All right. Judge White, anything you would like to add?

JUDGE WHITE: Yes. Again, I don't want to dwell too long on this CERCLA versus ISL situation. And I know that you're just using that as an example.

But at CERCLA again what you're trying to determine is what the water quality was like before it was damaged. So you have to really go outside the damaged area.

Is that correct?

DR. ABITZ: Again, baseline is baseline. Wherever you are there's a natural condition. It doesn't matter if the site's been disturbed or not because you're not going to do the natural condition at the disturbed area. You're going to go outside of it, like it you say.

JUDGE WHITE: That's true. But at an ISL site you have the natural condition at the epicenter of where the activity is going to take place. In other words, the activity hasn't taken place so you're sampling waters from the actual place where the activity is likely to create a disturbance.

Isn't that kind of a fundamental difference that is going to drive baseline determinations to at least some degree to be carried out differently?

DR. ABITZ: I do not believe so. When you're talking about ISL operations you're still talking about a very large area for aquifer exemption. The ore is not in that entire aquifer exempted zone.

Therefore the baseline is the baseline. You go in and you randomly select locations. You put in your wells and you try to not disturb the ore horizon as best you can. You have that added burden with an ISL operation.

JUDGE WHITE: Right. I understand.

DR. ABITZ: It has nothing to do with whether there's contamination or not because baseline and background means it's in an unaffected, natural occurring area.

JUDGE WHITE: Can I ask one other question to clarify as long as everybody is here, to clarify a point that really Strata folks should have been the ones to clarify it but the point was in fact covered by a staff witness.

The staff witness said in many cases if in an ISL ore deposit you have stacked ore

concentrations, in order to mine different levels, in other words ore that is at a different stratigraphic level than the initial ore you're mining, you can't retrofit an existing well. You have to actually drill a separate well.

Are stacked ores at the Ross site such that Ross Strata will have to drill separate wells to mine separate ore bodies at different levels within the site?

CHAIRMAN BOLLWERK: You're looking for a response from SEI?

JUDGE WHITE: I am. And in fact only from SEI since I don't think anyone else would have that information.

MR. SCHIFFER: Judge White, if we can, I believe in TR -- in Exhibit 14C we have an exhibit that clearly depicts how multiple stacked fronts would be mined and ostensibly how they would be -- how the water quality would be baselined.

If I could get maybe a clarification on the exact page. I believe it's in Chapter 6. If we can bring that up maybe that would help clarify this matter.

CHAIRMAN BOLLWERK: 14C, the Applicant's 14C?

MR. SCHIFFER: Yes. I'm sorry. Applicant 14C.

CHAIRMAN BOLLWERK: Chapter 6? Section 6 actually?

MR. SCHIFFER: Yes. That's what I meant.

MR. HARPER: Section 6 begins on page 271.

CHAIRMAN BOLLWERK: It's a pretty large section.

MR. SCHIFFER: It's going to be a figure.

CHAIRMAN BOLLWERK: Are the figures listed in the table of contents?

MR. SCHIFFER: Yes.

CHAIRMAN BOLLWERK: There we go. Which figure is it?

MR. PUGSLEY: Page 263 of this exhibit please.

CHAIRMAN BOLLWERK: Is that it?

MR. SCHIFFER: Yes, Judge.

Hopefully we can take a minute to look at this. But I think what you'll see is this confirms what Mr. Saxton discussed previously in the panel. It really looks at how these wells and how ostensibly the baseline would be established for the different front systems in a stacked scenario.

You'll see that one set of wells would be

used to establish baseline in a portion of the ore zone aquifer.

And another set of wells would be used to establish water quality baseline in another portion of the ore zone aquifer, particularly in the scenario where you have finer grain materials that may be of lower permeability that separate those mineralized areas.

I think this really goes to the heart of this discussion.

JUDGE WHITE: Okay. I think that's very clear. I'll reiterate it just to be sure.

You're saying that in fact separate wells will be used for mining the different levels within the stack, and also some of those wells initially will be used to determine separate CABs for each level that is actively mined, is that correct?

MR. SCHIFFER: Yes, sir.

JUDGE WHITE: And then when restoration time comes and mining ceases, will each of these levels be subject to restoration that then will try to meet that CAB baseline?

MR. SCHIFFER: Yes, Judge.

JUDGE WHITE: That's clear. Thank you. That clears that up.

CHAIRMAN BOLLWERK: Anyone else on the panel have anything they want to say on that subject?

All right. At this point it's about almost 5:30.

Judge Cole, do you have anything further?

JUDGE COLE: Nothing for right now.

CHAIRMAN BOLLWERK: Then I think at this point we will conclude the testimony on Contention 1.

I want to thank all of you for your service to the Board, the information you provided both in the individual panel and our larger panel here. This was a very enlightening and professional discussion and we appreciate all of you providing information to the Board.

I think we'll see most of you again. Again, we appreciate what you provided us today.

I should check on one thing. Does anybody have any cross-examination questions? We sort of did cross.

MS. MONTEITH: We have no further cross-examination questions.

MR. PUGSLEY: None from SEI.

MR. FETTUS: None from the Joint Intervenors.

CHAIRMAN BOLLWERK: Okay. Again, we

appreciate very much the efforts of all of you to provide the Board with information this afternoon.

We're now at 5:30 and I think we're going to start again tomorrow morning at 8:30. That was the agreement of the parties and that's when the Board will be here to start up with Contention 2. At that point we'll move forward and see how much we get done tomorrow. That's the plan.

I think you all now understand the way this is going to run now more or less. So hopefully Contention 2 and then Contention 3 will proceed the same way.

Do any of the parties have anything they need to bring to the attention of the Board at this point?

MR. HARPER: Just to reiterate that staff will circulate that document.

CHAIRMAN BOLLWERK: Right. That'd be good. If we do need to admit it we can do that. If we don't then we're good that way as well.

All right. Very good. Thank you, everyone. We'll see you in the morning. We stand adjourned until 8:30 tomorrow morning.

(Whereupon, the above-entitled matter went off the record at 5:30 p.m.)